THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XXII. No. 543.] LONDON, JULY 15, 1873. [25TH YEAR.] Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
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These Meters are warranted to measure correctly and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured.
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Particulars and lists of prices forwarded on application to—
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236, GEORGE STREET, GLASGOW;
OR
15, MARKET STREET, MANCHESTER.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

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THE OLD TUBE-WORKS, WEDNESBURY
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J. & W. ROMANS, Consulting Gas Engineers and Coal Factors, of Edinburgh and London, CONTRACT for supplying any quantity of COAL and CANNEL.
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Coal, machinery, fire goods, &c., shipped to all parts of the world.

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JAMES FERGUSON & CO.
LESSEES SINCE 1832.
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(INVENTED & PATENTED IN 1844,)
COMBINING ALL THE LATEST IMPROVEMENTS,
MANUFACTURED ONLY BY
THE GAS-METER COMPANY, LIMITED,
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LONDON, 1862;
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FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

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For Gas, Steam, Water, &c.

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IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,

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ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

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CAST & WROUGHT IRON TANKS FOR DITTO;

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IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

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PARIS, 1867.

CLASSES 24 and 53.

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LONDON, 1862.

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1862.

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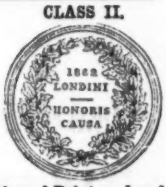

This Paint having been in general use over eleven years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

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TO ENGINEERS, GAS COMPANIES, RAILWAY COMPANIES, &c.

THE TORBAY PAINT COMPANY,

SOLE PROPRIETORS OF

GOVERNMENT PATRONAGE, ADMIRALTY & WAR OFFICE.

CALLEY'S GENUINE "TORBAY" PAINT

AND

THE ANTI-GALVANIC PAINT.

THESE PAINTS ARE SPECIALLY PREPARED, and are most valuable for protecting and arresting rust on all ironwork, AND WILL COVER TAR EFFECTUALLY; they adhere strongly, acquire great solidity, do not crack, flake off, or blister by heat, and they resist the effects of SULPHUROUS AND GASEOUS EXHALATIONS.

They are used extensively at a large number of GAS-WORKS, on Gasholders, Purifiers, and all classes of Ironwork; also by Government, Railway Companies, &c.

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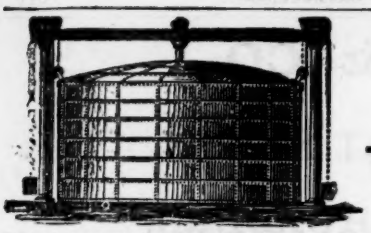

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WHITESTONE IRON-WORKS, HUDDERSFIELD.

SOLE MANUFACTURERS of B. W. THURSTON'S IMPROVED SCRUBBER, CONDENSER, and WASHER, in use in many of the principal Gas-Works on the Continent.

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(ESTABLISHED IN 1765,)

BOILER AND GASHOLDER WORKS,

Westbromwich, near Birmingham.

MANUFACTURER OF TELESCOPE AND SINGLE GASHOLDERS,

WROUGHT & CAST IRON TANKS

FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS,

And all kinds of GAS APPARATUS.

Wrought-Iron Roofs, Bridges, and Girders; Steam, Hot Water, and Range Boilers; Tanks, Cisterns, &c.,

And all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, and ESTIMATES FURNISHED.

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ENGINEERS, IRONFOUNDERS, & CONTRACTORS,

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MANUFACTURERS OF

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ALSO OF

STEAM-ENGINES, EXHAUSTERS, IMPROVED PUMPS FOR TAR AND LIQUOR,

SLIDE-VALVES,

AND ALL DESCRIPTIONS OF APPARATUS USED IN GAS-WORKS.

PATENTEES AND MANUFACTURERS OF THE

DRY-FACED CENTRE-VALVES,

Which are now so extensively used.

During the last year these Valves have been introduced into some of the large gas-works in London, where they are giving the greatest satisfaction. Favourable reports have been received from the engineers of these and of some of the most important works in the kingdom. The demand for them both for home and foreign works continues unabated.

Every Valve is made with covering bars, to protect ALL the faces. The Patentees found the necessity for this almost immediately after they commenced the manufacture of these Valves, and they have ever since adopted the practice. The large experience they have gained has also enabled them to introduce several minor improvements in the construction of their Valves. It is an advantage peculiar to these Valves that the covers can be easily raised, the faces cleaned and oiled, and kept in perfect condition. If managers of gas-works will periodically attend to this, the Valves will be as good after twenty years use as when first put in.

Messrs. COCKEY AND SONS have been very successful in the erection of many gasholders, some of very large size. They erected, in 1871, at Dublin, for the Alliance Gas Company, one of the largest in the kingdom; telescopic, 182 feet 6 inches diameter. It was referred to by the Chairman of that Company the following year, in his report to the shareholders, as having been in use, and working most effectively, since its erection, and being in the highest degree satisfactory to the Company.

Plans of gas-works are carefully prepared, and every improvement which long practical experience can give is introduced into works entrusted to the care of the Advertisers.

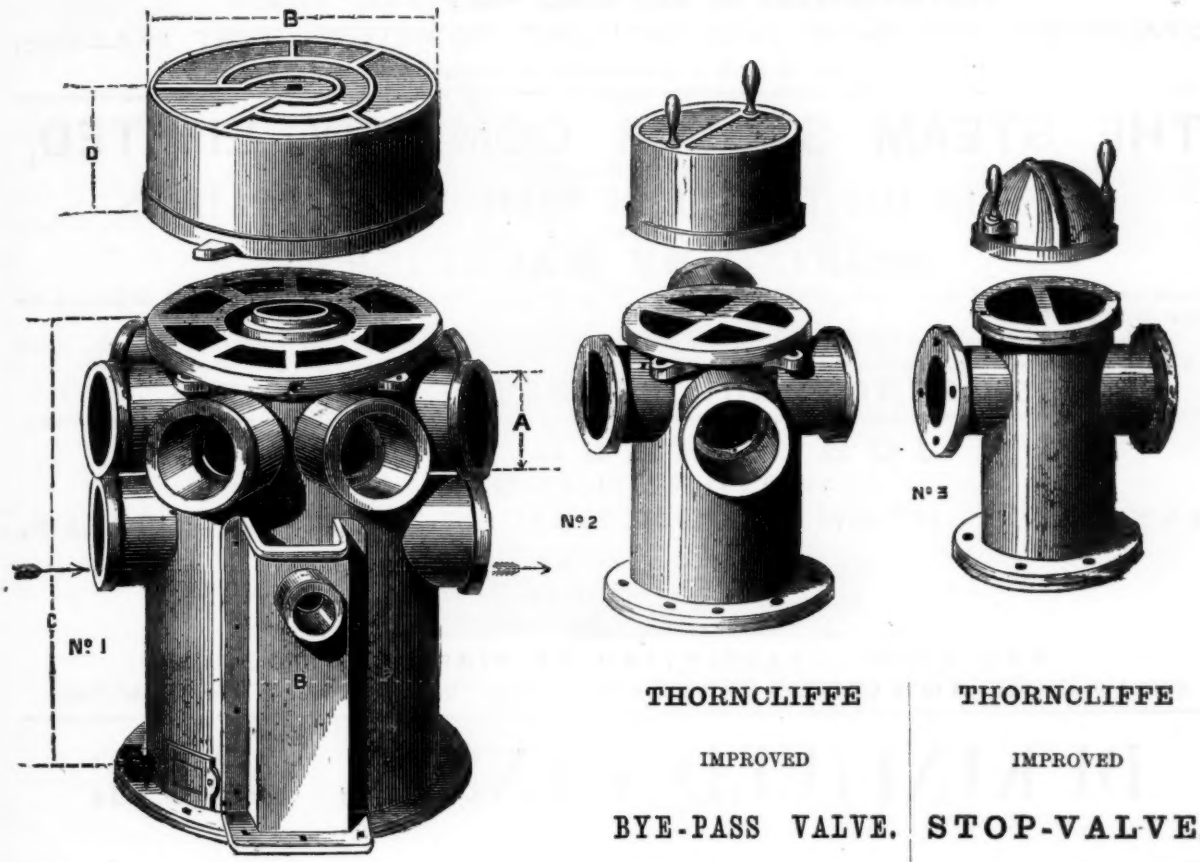
References can be given to the Directors of many Companies who have placed works in their hands, and who will testify to the satisfactory results of so doing.

THE THORNCLIFFE IMPROVED CENTRE-VALVE,

MANUFACTURED BY

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.



Sizes of the

THORNCLIFFE IMPROVED CENTRE-VALVE.

		Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A	Bore of Pipe...	4	5	6	7	8	9	10	12
B	Diam. of Body.	16	20	23	26	28	31	34	40
C	Height of Tank.	33	35	38	43	46	48	51	56
D	Depth of Cover.	8	9	10	11	12	13	14	16
	Total height...	41	44	48	54	58	61	65	72

THORNCLIFFE IMPROVED BYE-PASS VALVE.

SIZES

From 3 ins. upwards.

THORNCLIFFE IMPROVED STOP-VALVE.

SIZES

From 3 ins. upwards.

In all cases the Covers are cast heavy enough to resist any required pressure.

The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

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GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

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IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES;

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS,

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THE STEAM STOKER COMPANY, LIMITED,

ARE NOW PREPARED TO GRANT

LICENCES FOR THE USE OF THEIR VARIOUS PATENTS

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STOKING BY MACHINERY.

Under one or the other of their Patents, Machines can be adapted to almost any existing works without material alteration of the Retort-Houses or Settings.

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MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

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THE DUNKIRK COAL COMPANY.

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1795.

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WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

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Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

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SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

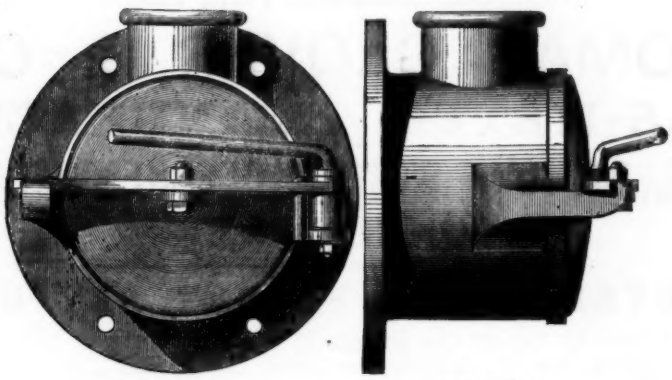
HOLMAN'S PATENT ECCENTRIC FASTENINGS.

OVER 7000 IN USE.

NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



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SIMPLE.

ECONOMICAL.

DURABLE

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

THESE LIDS ARE IN USE AT THE FOLLOWING (AMONG MANY OTHER) GAS-WORKS:—

The Gaslight Company, Beckton (where over 2000 are in use).	The Gas-Works, Royal Arsenal, Woolwich.	The Nottingham Gas-Works.
„ Gaslight Company, Bow Common.	„ Alliance and Dublin Gas-Works.	„ Newcastle-on-Tyne Gas-Works.
„ London Gaslight Company.	„ Edinburgh Gas-Works.	„ Carmarthen Gas-Works.
„ Independent Gaslight Company.	„ Manchester Corporation Gas-Works.	„ Merthyr Tydfil Gas-Works.
„ Phœnix Gaslight Company.	„ Salford Corporation Gas-Works.	„ Ystrad Gas-Works.
„ South Metropolitan Gaslight Company.	„ Rochdale Corporation Gas-Works.	„ St. Alban's Gas-Works.
„ West Ham Gas Company.	„ Liverpool United Gas-Works.	„ Over Darwen Gas-Works.
	„ Birkenhead Gas-Works.	„ Aylesbury Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial, among others, has been given:—

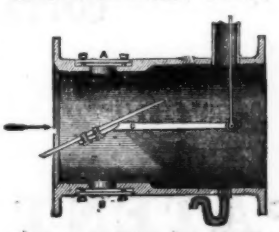
The Gaslight and Coke Company. Engineer's Office, 6, Westminster Chambers, Nov. 14, 1871.

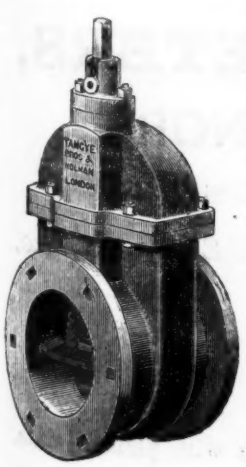
Dear Sir,—In reply to your inquiry, I have the pleasure of stating that the whole of the Mouthpieces at Beckton have Morton's Lids attached to them, and they have given us every satisfaction. We have 2160 in use.—I remain, yours truly, (Signed) F. J. Evans.

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communication being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber, upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.





London Gas-Works, Nine Elms, Dec. 25, 1871.

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Messrs. Tangye Brothers and Holman. (Signed) Robert Morton, *Engineer.*

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7 4 „ Screw Valves.	14 8 „ „	12 12 „ „
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TO CORRESPONDENTS.

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The JOURNAL has been duly registered at the General Post-Office for transmission abroad.

All communications for the Editor, remittances for subscriptions, and orders for advertisements should be addressed to the publisher, William B. King, 11, Bolt Court, Fleet Street, London, E.C.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 15, 1873.

Notes upon Passing Events.

THE session is closing with the usual slaughter of the innocents. Before another week closes a heap of padding will have been thrown into the parliamentary waste paper basket, and it depends on the House of Lords whether the Judicature Bill—the one great measure of the session—will pass into law; whether the law reform, which the most earnest pupils of Jeremy Bentham could scarcely have anticipated within a century, is to begin in earnest; whether the law's technical delays are to cease, and one office, like the Gates of Hades, be ever open to the suitor seeking a decision, if not justice. At any rate one great step in advance has been made since law reform has passed out of the region of party politics, and whichever party comes and goes, the shuttlecock of justice will no longer be battered to and fro between law and equity.

The hot weather calls our attention to the condition of meat. The butchers are losing thousands per week, and the time is convenient for considering the slaughter-house question. The *doctrinaires*, who have neither the use of their noses nor their eyes when once they have made up their minds, want to reduce the metropolis to a regimen of imported meat, or at any rate dead meat carried to the remotest circumference of the metropolitan centre from the market at Camden Hill. They do not see, and will not see, that there is a wide margin between the filthy premises of a slaughtering butcher not under proper supervision, and one set of slaughter-houses in the Metropolitan Market. The fact is that the Corporation have built a gigantic market which does not pay, and the brilliant idea has been devised by some of the Market Committee of making a revenue by taxing every animal killed for London consumption. If—which has been by no means proved—it is necessary to abolish well-built and well-managed slaughter-houses in the hands of private butchers, it will be necessary, unless London is to be condemned to eat stinking meat in summer, that a very large number of public slaughter-houses be erected within the metropolitan district. Here we are likely to benefit by the wholesome rivalry between the Metropolitan Board and the Corporation. Colonel Hogg has been examined before the committee on the subject, and has expressed an opinion that the abolition of private slaughter-houses will tend to increase the price of meat, and that he sees no objection on sanitary grounds to slaughter-houses properly ventilated, properly drained, properly supplied with water, and properly managed. Dr. Letheby differs from the colonel; but, although the doctor's opinion is of value as a chemist, he is not nearly so competent to understand the management of dead meat as the keeper of a first-class restaurant. The committee should call on Mr. Staples, late of the Albion, and Mr. Christopher Pond, of Ludgate Hill, and hear what they have to say on the loss sustained by meat carted long distances in hot weather.

Sleeping cars are shortly to be offered to travellers on the Midland line, for the benefit of the limited number who, for a limited period of the year, travel eight hours or more at a stretch to or from Highland shootings. When we examine the map of England, and learn how few are the routes from London on which the whole night is occupied in a railway journey, we cannot attach much importance to this Transatlantic importation. But no doubt the manager of the Midland has adopted it as a tribute and compensation to the first-class passengers whose comforts were temporarily interrupted by the heavy weight of third-class carriages attached to express trains. On the Continent the sleeping-car will be a real boon. To be able to sleep all the night from Calais to Hamburg, or Berlin, or Vienna, will be indeed a delightful change from stuffy French carriages cram full with all the windows up, and may lead to fewer of those changes from train to train in the middle of the night that form so unpleasant a feature of German railway travelling. It is, we suppose, because we are approaching the epoch for lunatic speculation that one sleeping carriage company has been projected, on the basis of giving an American patentee £30,000 in money and £20,000 in paid-up shares for his concessions and patents.

Mr. Henry Cole, C.B., retires on a pension equal to his salary, after fifty years in public service, and has at once accepted, as he was justified in doing, an appointment from the Commissioners of International Exhibitions at £1000 a year and a per centage on the profits. If we are to judge of the future by the past, International Exhibitions are not likely to yield much, if any, surplus after paying expenses. The Exhibition of this year is a terrible failure as far as visitors are concerned. Whether the exhibitors of sweetmeats, chocolates, macaroni, and mustard have paid such rents as will bring the commissioners home is a secret, for the commissioners do not publish any accounts. The success, if any, must be attained by working the Albert as a music hall, and a hit may be made then. Even now neither the Oxford nor the Canterbury can outvie the Albert in sensational advertisements. The name of the Persian potentate was used like that of any music hall star—the "Jolly "Nash," or the "Great Vance"—and when a Royal Highness is about to condescend to play the violin not much out of tune, the attraction is discounted in newspaper paragraphs. But, in spite of Mr. Henry Cole's propensity for using commercial arts to promote national objects, it must be admitted that he has created a very fine and truly useful museum for the cultivation of art and taste at South Kensington—a museum that, in variety and practical utility to art students, equals, if it does not excel, anything established and maintained by foreign Governments. It is understood that Mr. Cole has now undertaken to improve national music, and supersede the Royal Academy devoted to that art. If he fails in persuading Parliament to vote funds for a profession which is certainly not underpaid at present, he will very likely succeed in getting up concerts at very little expense in Albert Hall. Perhaps a school of ballet dancing may follow, and we do not despair of seeing, under Mr. Cole's enterprising management, a display of acrobatic and gymnastic feats, for which the circular hall is so admirably suited in every way.

The Thames Embankment (northern side) has at length been turned to practical use, in addition to its value as a fresh lung of London. The traffic of Temple Bar has been turned over it during the progress of pavement repair. After this, perhaps parliamentary committees may relent, and permit this fine thoroughfare, now a desert, to be traversed by tramway cars, which may connect two or three railway stations.

The Commissioners of Sewers, after many years of fruitless negotiation, have succeeded in coming to terms with the ecclesiastical governing authorities of St. Paul's, the present Archdeacon proving less impracticable than his eminently conservative predecessor. The public ways are being widened at the north-west and south-west

ends of the cathedral. A large slice of the land now enclosed in railing will be laid into the public way. "The railing will be "removed, and a line of kerb of the same level as the footway "paving, with ornamental granite posts, will be placed around the "area, not laid into the foot-paving, thus affording a large additional "accommodation for carriage traffic, and increased opportunities for "viewing the splendid western front." The commissioners have endeavoured to throw open the roadway on the northern side, on a line with the shops, for general carriage traffic, but have been unsuccessful, chiefly from the opposition of the tradesmen to the incidental noise and dust. We shall be surprised if this concession on the part of the ecclesiastical authorities does not lead to more liberal contributions towards the much-needed completion of the decoration of St. Paul's.

We are glad to see that the efforts of Earl Stanhope and Lord Houghton to create a new riband and star for rewarding merit in literature, art, and science met with no encouragement in the House of Lords. Our experience of honorary rewards of the kind is anything but satisfactory. In France, the turnkeys of gaols, successful grocers, and devoted mayors get "the Cross" of the Legion of Honour, and for the cross all ranks enter an ignoble competition. We were at Roubaix when the late Emperor of the French paid that important manufacturing town a visit. Roubaix is the Bradford of France. The principal manufacturer was charged to receive the Emperor, and represent how dissatisfied the town were with the water-works planned by Government officials. At the critical moment the orator forgot to deliver anything but compliments. His friends, all Orleanists and Protectionists, declared that he was dumb because he wanted "the Cross." Our experience of C.B.'s, K.C.B.'s, and knighthoods in England is not more satisfactory. Surely, if ever there was a great personage who understood the claims of science and art, it was Prince Albert, and yet he had the credit of offering a simple knighthood to the constructor of Menai Bridge, and of obtaining K.C.B. for a gentleman who had been the secretary and a sort of head valet to his Royal Highness. We once saw, at a dinner of the Literary Fund, an Englishman with his breast covered with orders, ribands, and medals. He turned out to be a pertinacious book-maker and beggar of foreign orders. What we really need may be more properly supplied by our wealthy universities, out of funds now wasted in encouraging the idleness of clever young men. If fellowships were bestowed on learned men like Michael Faraday, engaged on unprofitable and important pursuits, after they had proved their merit, England would be rescued from a great reproach. Popular authors and popular artists are sufficiently rewarded. An income bestowed on men like Dr. Carpenter or Professor Owen, who pursue science for love, not money, would be something much more creditable than such an institution for the cultivation of lazy gentlemen as All Souls College, Oxford.

The weariness that invariably steals upon Parliament at this time of the session, hot weather, the reaction after the excitement of fêting the Shah, an appreciation of the use of claptrap in addressing constituents at an early date, have, in combination, had a sensible effect on the divisions of the House of Commons. First we have a resolution carried in favour of raising the salaries of all the civil servants in Ireland, without the trouble of inquiring what these clerks do, or whether they have anything to do at all. The Irishman, like the Frenchman and the Italian, has a passion for place, and is better satisfied with a small genteel salary, with little to do, than with hard work and a liberal income. The ruling powers in Ireland—Whig and Tory—took advantage of this weakness long before competitive examinations were dreamed of, and multiplied plans to reward their friends, or rather supporters. The true principle of administrative reform in Ireland, as in England and Scotland, is to keep only "as many cats as catch mice," and to pay them what they are worth. The majority of Civil Service work is the merest routine—copying letters and doing easy sums in arithmetic. In the good old times, men who could scarcely write at all rose by seniority to handsome salaries, and were superannuated in the full vigour of life, in order to get rid of them. At present the Civil Service is being worked on what Jeremy Bentham called "the reverse of "wrong fallacy." Patronage, equally baneful to the receiver and the giver, has been abolished. Ministers and members of Parliament are no longer worried to make provision for the sons, nephews, and illegitimate children of faithful supporters and aged menials. The screening sieve of competition, applied to all candidates for the appointments open to the young, keeps out dense ignorance. As the examiners find that competitors continue to crowd up, they narrow the meshes, and ask candidates for posts of £100 a year to answer questions that, well answered, would qualify for a professorship of ancient and modern literature. The system has been at work long enough for many successful candidates to discover that they have won a loss—that their serious preliminary studies do not yield them more income than that of a lawyer's clerk who writes a good hand and understands the first three rules of arithmetic. They complain that they are disappointed, and that they are starved. They have voices, they have pens, and their friends have votes; an agitation is got up on the strength of a real grievance—viz., gentlemanly young men who have passed a severe competitive examination, and after ten years do not receive enough income to live like gentlemen. But when the head of a department of the plain-speaking order, like Mr. Chancellor of the Exchequer Lowe, is examined by the committee of the House of Commons now sitting on the Civil Service grievances, a very different turn is given to the complexion of the case. He does not dispute that highly educated young gentlemen under the present system are set to do very common-place work at very low salaries; but then he says the salaries, taken with the pensions, are worth more than the work. Government work, like the work of any great mercantile or manufacturing establishment, may be divided into several classes. The cheapest is mere clerk's work—the work of a law stationer's clerk. There is no reason why these should be on the establishment, or otherwise employed than on piecework, or by the hour, at the full market price of the day. The next class would consist of clerks on the establishment, whose work is of a very ordinary character, requiring neatness, punctuality, and attention, but no intellectual or original ability. These, if they know what to expect when they *enlist*, would be satisfied with the eventual salary of a cashier in a good bank. The third and smallest class, according to Mr. Lowe, should be recruited from well-educated gentlemen, commence with £200 a year, and proceed to respectable salaries, with the chance of being selected for the under-secretaryship or the principal secretary's personal staff. These principles are the same as those on which any one would conduct a large business requiring many clerks and chief clerks. This result of competitive examination might excite the indignation of two classes—those who advocate what they call liberality in official pay, and those who claim perfect equality for all literate classes; but according to sound English principles of government, everything is mischievous that tempts men from the ordinary pursuits of professional or commercial life to the ease and indolence of a public office. If the recent proclamation of the grievances of civil servants deter some considerable number from enlisting in a career of genteel poverty, many industrious young men will be saved from disappointment, and the nation will lose nothing. But one thing is quite certain—the House of Commons cannot establish a character for economy, and also indulge in the sham liberality of votes meaning nothing, to spite a Government, or to conciliate constituents related to Civil Service clerks.

Mr. H. Richard's motion for giving good advice to foreign States for preserving them from the horrors of war, of which they all know a great deal more than we do, is another sham of the same character. Nations, like individuals, hate good advice, and especially *goody* advice. Mr. Henry Richard is to be excused. Professional philanthropy—platform philanthropy—is his trade. It has made him a member of Parliament, just as Free Trade made Mr. Cobden, and Protection Mr. Disraeli. But no public man with two ideas believes that in case of a threatened war between France and Germany for the Rhine provinces, Germany and Russia for the Baltic provinces, France and Italy for restoring the Pope to his kingdom, any one of the parties would refer the dispute to arbitration. But after the temporary success of the peace-at-any-price advocates, we see no reason why a resolution should not be carried in favour of abolishing judgment after execution; and, relying on moral suasion to induce defendants to pay debts, restore estates, and obey the unpleasant orders of a court of equity, why the enormous expense of police should not be saved. Why did not Mr. Richard try his hand on President Lincoln and President Jefferson Davis, and on the Emperor Napoleon and the King of Prussia? Our principal experience of foreign ideas of justice has been gained at international shows of manufactures, where on one point we always found foreigners agreed, and that was to give no prize to an Englishman if it could be avoided.

Extremes meet. Mr. Mitchell Henry, more Irish than the Irish, and Mr. Whalley agree to abuse reporters who decline to set down what no one cares to read. It is really amazing that Henry and Whalley should expect to succeed where O'Connell failed. It is significant, if not remarkable, that it is the dull people who object to "count-outs"—our substitute for the *clôture*—and demand official reports. Daily papers are, fortunately, commercial speculations, and cannot afford to leave out anything people want to read, however foreign to their principles. The most Puritan of daily papers gives the most accurate reports of racing meetings and betting transactions.

THE PARIS GAS COMPANY.

THE annual meeting of the Paris Gas Company was held on March 27 last, and, in accordance with our usual custom, we present our readers with a short abstract of the report presented to the shareholders of this important company, the largest gas company in the world. During the past year the company completely recovered the ground lost in the disastrous period 1870, 1871, and although 1872 was the first of the 33 years in the course of which they have to redeem their share capital, and the sum of £39,390 had to be devoted to this purpose out of profits, the company were still able to pay the shareholders the same dividend they paid in 1869. It may be worth while here to point out how an arrangement of this kind, which compels a company to redeem their capital within a given period, at the end of which the undertaking passes without charge into the hands of the municipality, presses on the present generation of gas consumers. But for this a reduction in the price of gas to the extent of 20 per cent. might have been made, but, as it is, the consumers in Paris will be compelled to pay an exorbitant price for 33 years, with the doubtful prospect of their successors obtaining a reduction when the works become public property.

The quantity of gas the company delivered for consumption in 1872 was 5,212,692,084 cubic feet, rather less than the quantity sold by meter by the Chartered and Imperial Companies put together. A steady increase of consumption is exhibited by this return, which, it is remarked, is mainly owing to the extended use of gas for industrial and domestic purposes during the day, for the early closing movement has spread to Paris, or the habits engendered by the siege have established themselves, and the consumption in shops at night is much diminished.

On the 21st of December last the company had laid 960 miles of mains, supplied 94,774 consumers (an average of rather less than 100 to the mile), and 36,573 public lights.

The form in which the accounts of the company are stated renders it impossible for us to produce a statement which would enable our readers to compare the working of the Paris Company with that of a London company; but we extract here the chief items of expenditure and receipts.

Expenditure.

Coal	£494,447
Heating materials, coke, and tar	196,016
Superintendence and labour in manufacture	62,190
Maintenance and repairs of works, including the cost of altering furnaces for heating with tar	52,340
Purifying materials	6,622
Expenses of distribution, repairs of mains and services	43,657
Directors allowances	6,000
Salaries	20,931

Receipts.

By sale of gas	£1,433,446
Coke	426,973
Tar	45,224
Ammoniacal liquor	9,156

The business of the Paris Company is so varied, including, as it does, gas-fitting, the manufacture of bricks, &c., chemical products and stoves, that the other items of receipts need not be quoted. Our object is to show as well as we can the expenses and receipts of the company as regards the production and sale of gas and products. The total expenditure, which includes interest on debentures as well as the sum named above applied in paying off shares, and a further sum of £30,480 in payment of borrowed money, amounted to £1,187,177, and the total receipts to £2,088,746, showing a gross profit of £901,569 to be divided between the municipality and the company. Deduction made of the part accruing to the municipality, the sum of £696,000 remained to be divided among the shareholders.

The figures in the above abstract which will most strike an English reader are those which show that the sale of products, coke, tar, and ammoniacal liquor, more than pays for the coal carbonized, and it must be observed that the sum we quote is that received for retort coke sold. The Paris Company make and sell furnace coke, but we do not take that into our account. With good reason the directors congratulate themselves on this increased value of coke, the consumption of which they stimulate by the manufacture and sale of stoves adapted for the consumption of this fuel in private apartments. They sold 2110 of these stoves in 1872, and in all they have sold 33,992. In Paris, as here, some advance in the price of labour has taken place, but a good understanding exists between the men and the company. The mode of remuneration they have adopted is a fixed daily wage for an average amount of work, with additional pay for work beyond the average. They also give a monthly prize of 15 francs to every man who is not absent without leave during the month. The men are also supplied with coke gratis.

The advanced price of coal causes the directors some alarm, and, like ourselves, they wait for Mr. Mundella's committee to explain the reason for the extraordinary rise. They hope, however, that the large price will result in the raising of an additional quantity of coal, and for the rest congratulate themselves that the price they are able to put upon coke compensates them for the advanced cost of coal.

Circular to Gas Companies.

EARL COWPER has considerately brought a Bill into the House of Lords to amend the Gas and Water Works Facilities Act, 1870. It was read a second time on Friday last, and will probably pass the House of Lords without opposition. The Bill is not exactly what we wished for; but, inasmuch as half a loaf is better than no bread, we may accept it with a certain amount of thankfulness. It has been framed obviously to conciliate Lord Redesdale, and if carried will practically embody in an Act of Parliament the resolutions adopted by the House of Peers on his lordship's proposal. Our space is so fully occupied that we do not print the Bill at length, but its chief provisions are as follows:—The Act is to apply where the amendment of any special Act is desired by undertakers or local authority in relation to the prescribed illuminating power of gas, maximum price, or prescribed pressure. Provisional Orders amending special Acts in these particulars may be obtained on application to the Board of Trade made previous to Aug. 1, 1875. The Act will, therefore, only be in operation during the next two years. During this time a company may apply for power to raise their maximum, or a local authority may ask for an order to compel a company to reduce their price. Such an application from a local authority would hardly be listened to, unless it was shown that the company paid the maximum dividend and had a considerable balance over. On this point we must request attention to the letter by Mr. Livesey in another place. Of course certain formalities will have to be observed in order to obtain the orders. With these we do not at present trouble our readers. They are not unreasonable; and if the Bill should pass, we shall advise our subscribers on all points. The Board of Trade are to consider the application, and any objections made, and determine whether it may be proceeded with. The clause following is the essence of the Bill, and we print it at length:—

> Where, with a view to prevent undue loss to any undertakers arising from unusual increase in the cost of production of gas, or to the prevention of undue accumulation of profits by undertakers, it appears to the Board of Trade expedient and proper that the application should be granted, with or without addition or modification, or subject or not to any restriction or condition, and it has been proved to their satisfaction that all the requirements of this Act have been in all respects complied with, the Board of Trade may settle and make a Provisional Order accordingly; provided that the operation of such Provisional Order shall be limited to such period (not exceeding three years) as the Board shall therein prescribe: provided also, that where any addition shall be made by any such Provisional Order to the maximum price of gas prescribed by the special Act, provision shall be made by such Provisional Order that the undertakers, being a person, company, or companies carrying on business under the special Act for his or their own pecuniary benefit, shall not divide more than at the rate of 5 per cent. per annum on their ordinary capital for any half year in which they shall have charged more than the maximum price prescribed by the special Act, or if such undertakers shall not have paid a dividend of 5 per cent. on such capital for the two financial years next preceding the application, more than such sum as shall have been the average amount of the dividend in such two years; and before allowing any such addition the Board of Trade shall ascertain the amount of dividend paid on such capital during the said two years, the contracts, if any, for coal still in force, the present and former prices received by them for coke and residual products, the amount of gas unaccounted for and lost during each of the said two years, and their charges for gas during the same period.

This is a very strange proposal, and the exact meaning is not perfectly clear to us. It would appear that no company is to be permitted to pay more than 5 per cent. while they charge more than the maximum price allowed by their special Act. That is all very well. But supposing a company (and there are such cases) not to have divided 5 per cent. for the past two years, then they are not to be allowed to pay more than the average amount of dividend in such two years, which in more than one case, we believe, will be an average of two ciphers. This is not relieving a company, but binding them to their misfortunes. Let it be enacted, if it so please our legislators, that gas companies shall not divide more than 5 per cent., but it is absurd and unjust to say to a company dividing only 3 per cent. that they shall not pay a larger dividend. There is, unhappily, no consistency in the legislation on gas matters, and the muddle is continually made worse. The large London companies—three of them at least—can go to the Board of Trade for an order, which the Board are bound to grant, enabling these companies to raise the price of gas so as to produce the maximum dividend of 10 per cent., but the unlucky country undertakings are very differently treated in this Bill. Again, the orders granted by the Board of Trade to the London companies do not require confirmation by Parliament, but every order obtained under this Bill will have to run the gauntlet of the two Houses, including Lord Redesdale. The order may, however, come into force as soon as it has been obtained, and will remain valid until Parliament refuse to confirm it; so that by good management, if an order be obtained, at least six months advanced price may be secured. Such is essentially the last piece of patchwork legislation proposed for us. We do not admire it, but in these days must be thankful for small mercies.

The Municipal Corporations (Borough Funds) Amendment Bill, though repeatedly passed over, is still impending, and will require careful watching. It is on the paper again for to-night, but is so low down that there would seem to be small chance of its being taken. The danger is that, like the original Bill, it will be hurried through the Houses in some of the latest sittings, when the green and red benches are very empty, but the ministerial team is kept well in hand. We hope we may confidently expect that at least one of the five members of the House of Commons who have notices of motion involving the rejection of the measure will be found in his place whenever the Bill is brought on, but the result will be doubtful if the Ministry be in earnest.

Mr. Mundella's Coal Committee have finished their proceedings, so far as the examination of witnesses is concerned, and we now await their report. In the meantime, the evidence they have taken is before us, and it is not difficult to guess the nature of the report the committee will present. The *Times* puts the one point on which all the witnesses agreed in a very few words: "Coal will never again be "so cheap as it was two years ago." We may take that as certain, and our readers need not be reminded how often within the last two years we have called attention to the progressive rise of price, and warned them to be prepared for a large permanent increase. We are still of opinion that present prices will not be maintained, while compelled to admit that there is no prospect of an early reduction. The demand for the iron trade is still very large, and the chemical trades continue in a state of unexampled prosperity. All this points to a continuation of high prices disastrous to none but the unfortunate gas companies, tied down to a maximum price for the article they produce.

The evidence makes it abundantly clear that the sole cause of the advance in the price of coal was an excessive demand, of which the owners naturally took advantage, followed in the same direction by the men. It is admitted that the increased cost of labour has added but 1s. 6d. per ton to the cost of coal, while the operation of the Mines Regulation Act may have added another 6d. In 1871 West Yorkshire coal was sold at the pit's mouth for 5s. 8d.; the price is now 13s. 1d. It is clear then that, in the words of one witness, "the owners have made a pretty nest egg." We do not blame them. Every one would have done the same under the circumstances. Our grievance is that there are some four hundred gas companies in the United Kingdom who are debarred by law from raising the price of gas beyond a certain maximum, whatever may be the cost of the coal required to produce it. We have before us a paper which shows that, to a considerable number of companies, the increased cost of coal last year actually amounted to a larger sum than would be required to pay their authorized dividend. This year these companies will be in a worse case, for coal is still dearer.

A committee of shareholders have published a report on the present management and future prospects of the Alliance and Dublin Gas Company. It is a very temperate document, in which it is insisted on that if a proper amount of gas be extracted from the coal, and a normal proportion of this gas be sold to consumers, the company can easily pay the full authorized dividend of 10 per cent. The figures relied on to support this statement are taken from the

evidence of the engineers examined when the Dublin Corporation Gas Bill was before a committee of the House of Commons. Their general accuracy, we believe, cannot be impugned, and we are forced to the conclusion that improvement is possible in the conduct of the affairs of the gas company. If, for example, it be true that in the past year only 8627 feet of gas were obtained per ton of coal, and of this only 6308 feet were sold, it is not difficult to see how the dividend was lost, and at the same time where it may be found. It is quite unnecessary to turn out a board of directors who have served the company zealously and well for a long series of years, and it would be a mean and paltry thing to reduce the salary of the secretary a hundred or two a year. The cause of loss being now clearly apparent, it may be expected that all will work harmoniously to remedy the defects, and place the company in the position it should occupy as one of the most prosperous in the kingdom. The times, however, are critical, and the committee must not expect their 10 per cent. immediately. It is very easy to conduct the affairs of a gas company with perfect success *upon paper*, and draw up a balance-sheet exhibiting a large profit; but sanguine expectations are not always realized, and this year the cost of coal (which will not be affected by turning out the directors) will, we fear, stand in the way of making much profit, even if the works were in the most satisfactory state. We are certain we may take it for granted that every one concerned will do his utmost to promote the prosperity of the company in which he is as much interested as any one of the committee of shareholders.

In the summer instructions of the Metropolitan Gas Referees, notice was given that from and after the 1st of the present month the maximum of sulphur to be allowed in the gas made at any station under their control would be 20 grains. The referees have, however, seen occasion to modify this order, and a supplementary one has been issued, raising the maximum in the cases of the Imperial and South Metropolitan Companies to 25 grains, with an intimation that in the winter months still more may be permitted. It is a pity that the referees weaken their authority by making orders which cannot be obeyed, and which they are subsequently compelled to withdraw. Patient and cautious observation will in time teach them what can be done at each particular station, and in the meantime it may be hoped that managers will do their utmost to reduce the sulphur in their gas to the lowest possible amount.

The eminently sensible address of Mr. M'Crae, the President of the North British Association of Gas Managers, deserves a word of notice. A practical man addressing practical men, he went at once to the questions which are uppermost in the minds of all gas managers, and gave the best advice he possibly could when he recommended his brethren in the Association to do all they could to improve the present mode of carbonizing coal, with the view to obtain the largest yield of gas of the best possible quality. It is a misfortune that in these days the numerous schemes brought into prominence by ignorant quacks distract the attention of both directors and managers from matters of the most importance to them. The former will readily vote money for a trial of some purely fanciful system which it is boasted will supersede the manufacture of gas from coal, while they will deny their manager the means of making some rational experiments by which he hopes to improve the production of gas from coal. We cannot too emphatically recommend both directors and managers to close their ears to the seductive schemes brought under their notice, and devote all their intelligence and energies to the improvement of the process they have in hand; and first of all the carbonizing department deserves attention, for it is there it is truly said that profits are made. Another matter referred to by Mr. M'Crae was one we have often mentioned when noticing Scottish gas Acts. Why should our northern brethren persist in having 25 or 30 candle gas, and so hasten the exhaustion of their cannel-fields? Present prices will probably bring about a change, for we take it that the price of cannel coal will never be reduced. We cannot conclude this brief reference to Mr. M'Crae's address without thanking him for his appreciative notice of the late editor and proprietor of the JOURNAL OF GAS LIGHTING.

With regard to the schemes we have referred to above, we may call attention to a letter in to-day's issue, from a correspondent whose opinion is worthy of all confidence, which fully bears out the assertions we have repeatedly made, that the supply of light petroleum spirit to be calculated upon entirely precludes its extensive use in gas-making. If, as our correspondent point out, "air gas" or "new "gas" should prove a success (not yet demonstrated), the Americans would keep their light spirit to themselves, or only let us have it at a price which would not for a moment allow the "spirit gas" to compete with coal gas.

We have to-day only space for a very brief reference to the papers we publish read at the meeting of the British Association of Gas Managers, but must call particular attention to that by Mr. Methven, "On Coals Wasted." All authorities concur in the opinion that the true remedy for the present condition of things is economy in the use of coal. The author shows clearly the enormous waste of coal caused by ineffective carbonization and excessive leakage. This being clearly established, the remedies are apparent enough.

DUNFERMLINE GAS COMPANY.—The annual meeting of shareholders took place on the 25th ult.—Mr. Thomas Spowart, of Broombead, in the chair. A dividend of 22s. 9d. per share, being at the rate of 6½ per cent. on the value of the stock, was declared. Amicable arrangements have been come to between the Town Council and the company as to supplying the town with gas. A demand made by the stokers for eight-hour shifts, in place of twelve hours, was conceded by the directors, at an extra expense to the company, rather than submit to the inconvenience and annoyance of a threatened strike; and the men, by this grant, have now a clear Sunday three times in the month. Great extensions have been made on the works, which will enable the company to meet a largely increased demand for gas. The report was adopted.

Correspondence.

GAS MANAGERS MEETING AT EDINBURGH.

SIR,—In your report of what I said on Mr. Eldridge's paper on purification of gas from ammonia, I am represented to have stated—"If they passed gas through ammoniacal liquor of 6 oz. strength for instance, and then passed it through water or ammoniacal liquor of 12 oz. strength, they would have their gas *pure*." What I did state was that the gas would be "*impure*."

The hall in which we met was a very bad one for hearing in, and I dare say your reporter lost the first syllable of the word. G. ANDERSON.

19, *Northumberland Street, Charing Cross, W.C., July* 2, 1873.

[Our reporter states that he experienced great difficulty in the performance of his duties from the imperfect acoustic arrangements of the hall. During the sittings the President and others repeatedly complained of their inability to follow the remarks of members who spoke from the body of the meeting. The error above referred to is probably due to this cause. Mr. Broadhead, of Grimsby, writes to say that he gave the mileage of mains in his town as 20, and not 50 as reported in our last.]

THE SUPPLY OF PETROLEUM SPIRIT.

SIR,—As new companies are still being formed, and processes patented for the manufacture of gas from light petroleum spirit, by saturating air or some other gas with its vapour, the statistics, showing the available supply of this spirit, may interest your readers.

And first allow me emphatically to contradict the statement so frequently put forward that the supply is "unlimited." I have been connected with the mineral oil trade from the time of the first discovery of American petroleum, and I know for a fact that the supply is very limited indeed, as the following statistics will prove.

The only available source of the light petroleum spirit, which all the new companies require for the manufacture of their gas, is the crude petroleum from the American wells, and especially that from the Pennsylvanian oil region. Now the total yield of crude petroleum in 1872, including the whole of the United States and Canada, was 7,394,000 barrels of 43 American, equal to 34½ imperial gallons, making the total yield in imperial gallons 255,083,000. The yield of spirit of the usual commercial gravity of 705° may be safely taken at about 10 per cent. of the crude oil, or 25,508,300. This spirit has to be separated in the process of refining, to render the refined burning oil sufficiently safe; and although valuable, and lately used for many purposes, there is not as yet a demand at all equal to the supply—in other words the crude petroleum, which is composed of a great number of liquid hydrocarbons of different boiling points and gravities, has to be separated by the refiner into several liquids, such as burning and lubricating oils and spirit, which it yields in certain proportions, and there being a greater proportional demand for all the other products than for the spirit, the supply of the latter exceeds the demand, although this is considerable. To avoid all controversy as to the extent of this demand, I will omit it altogether from consideration, and take the whole 25½ million gallons produced as available for the manufacture of gas, as far as the market for it is concerned; but the gravity of this spirit is, as I before observed, about 705°, whereas all the air gas and other processes require a spirit of 650° to 660°, or at the very outside of 680°; and although I believe it is very doubtful whether such a heavy spirit will answer, in the following calculations I assume that it will, in order to give the outside limit of supply.

I find, on examining samples of the spirit now offering in London, that it yields about 25 per cent. of the required gravity of 680°; therefore one quarter of the 25½ million gallons, or not quite 6½ million gallons, is the extreme limit of possible supply of spirit of the required quality, and multiplying this amount by 800, the largest number of cubic feet which any inventors have yet ventured to state that their process will produce from 1 gallon of spirit, we have 5200 million cubic feet of gas as the total amount that all the new companies can under the most favourable circumstances produce. This is only one quarter more than is consumed in New York alone, and is equivalent to the gas produced by about 570,000 tons of coal, or only about one-half per cent. of the quantity of coal raised in 1872 in Great Britain.

As in all cases where the supply largely exceeds the demand, the price of the spirit is very irregular, with an average below the cost of production; it is, therefore, evident that all calculations based on present prices must prove fallacious as soon as the demand exceeds the supply, which it must do very soon if air gas proves a success. And, in this case, it is scarcely conceivable that any spirit will find its way into our markets at a price that will allow of its being used for gas-making in this country, for the heavy cost of freight on such a dangerous article, the expense of vessels to contain it, and the loss by leakage during transit, will make it more profitable for the Americans to use it all themselves. This consideration alone should make our gas companies hesitate before going to the expense of substituting spirit for coal gas, as the greater the success the more sure are they to be robbed of the fruits of their trouble by the Americans.

I hope that the importance of the subject will prove a sufficient excuse for the length of this letter. EDMUND R. SOUTHBY.

36, *Willes Road, Kentish Town, July* 7, 1873.

A PROBLEM.

A practical meter-tester sends us the following in answer to the letter which appeared in the last JOURNAL:—

SIR,—I beg to submit the following answer to the problem in yours of July 1. As I could not find a convenient place adapted for the 100 feet test, I suspended 50 feet special for the test two 3-light wet experimental meters connected above each other on each end. The meters were tested correct with transfer as used by the London referees to register a cubic foot exact compared with it:—

Pressure.	Top Meter. Cubic Feet per Hour.	Bottom Meter. Cubic Feet per Hour.
5-10ths . . .	9·892 — 0·926 . . .	10·818 + 0·926
10-10ths . . .	15·300 — 0·136 . . .	15·426 + 0·136
15-10ths . . .	19·956 + 0·603 . . .	19·353 — 0·603
20-10ths . . .	25·380 + 1·320 . . .	24·060 — 1·320
29-10ths . . .	29·416 + 2·412 . . .	29·204 — 2·412

W. L.

GAS AND WATER FACILITIES ACT, 1870, AMENDMENT BILL.

SIR,—I send herewith a copy of this bill, lest it should have escaped your notice, having only been issued to the public on Friday last. There is a provision in it which will affect all gas companies, and I expect be very much objected to.

The bill has been introduced by the Board of Trade at the instance of some of the companies themselves, with the object of providing relief by means of Provisional Orders, in cases where, from the great increase in the price of coal, labour, &c., the companies are not only not able to make any reasonable dividend out of their maximum rates, but even to pay their ordinary working expenses.

When this matter was first brought under the notice of the board, the board intimated that if a power were given to gas companies to apply for an increase to their maximum rates when they found them insufficient, a corre-

sponding power for the protection of the public ought to be given to local authorities to apply for a reduction of rates when they considered them to be too high; and it was conceded that when a company had obtained power to increase its rate, and such increase had been in operation for twelve months, the local authority, so long as the increase was continued, but no longer, should have the power to apply for a reduction of the rate.

The bill, however, goes much beyond this, and gives power to all local authorities to apply for a reduction of the rate charged within their district, irrespective of any consideration as to whether that rate has been previously increased or not.

If the Act were passed, there probably would not be more than from 50 to 80 companies who would desire to avail themselves of it. It is therefore proposed that in order to give relief to these 80 companies, all the companies in the kingdom should be subjected to this oppressive regulation. Can this be seriously intended?

When this matter was first proposed to the Board of Trade it was intended that the increase of rate should be sufficient to allow the companies to pay their full authorized dividend, whatever it might be, and under such circumstances it was admitted that the public were entitled to some security that the rate should be lowered again as soon as possible; but long after this the House of Lords, on the motion of Lord Redesdale, passed a resolution that when any company was allowed to make any addition to its maximum rate, it should be for a limited time only, and so long as that addition was continued the company should not pay any higher dividend than 5 per cent. per annum; and these conditions are inserted in the present bill.

These are oppressive regulations as against the companies, but surely they are ample protection for the public that the companies will reduce their rate as soon as possible in order to realize their full authorized dividend, which they cannot do until the rate is reduced. If these provisions are to be retained, the other provisions designed for the protection of the public are altogether unnecessary, and ought to be struck out.

There are two or three other points which will require alteration, but it is unnecessary to mention them here.

If you can find room for this in your next publication I shall feel obliged.

Gas and Water Companies Association, W. LIVESEY.

6, Victoria Street, Westminster Abbey, S.W., July 12, 1873.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JUNE 30, 1873.

DEWSBURY AND BATLEY CORPORATION GAS BILL.—Reported, with amendments.

BARROW-IN-FURNESS CORPORTION BILL.—Read third time, and passed.

TROWBRIDGE WATER AND UXBRIDGE AND HILLINGDON GAS BILLS.—Read third time, with amendments, passed, and sent to the Commons.

The Gaslight and Coke Company, Newcastle-upon-Tyne and Gateshead Gas, and Lincoln Gas Bills were returned from the Commons with the amendments agreed to.

POLLUTION OF RIVERS BILL.—The Viscount Gordon added to the Select Committee, in the place of the Earl of Lauderdale.

TUESDAY, JULY 1.

BRITON FERRY LOCAL BOARD BILL.—Returned from the Commons, agreed to.

BRIGHTON AND HOVE GAS BILL.—Returned from the Commons with the amendments agreed to.

THURSDAY, JULY 3.

AYR BURGH BILL.—Reported specially from the Select Committee, with amendments.

WREXHAM AND EAST DENBIGHSHIRE WATER BILL.—Report read from the Select Committee, that it is not expedient to proceed further with the bill.

DEWSBURY AND BATLEY CORPORATIONS GAS BILL.—Read third time, with the amendments, and passed, and sent to the Commons.

DONCASTER CORPORATION WATER BILL.—Returned from the Commons, with the amendments agreed to.

POLLUTION OF RIVERS BILL.—Message from the Commons, giving leave to Dr. Lyon Playfair (a member) to attend the Select Committee on this bill.

FRIDAY, JULY 4.

DUMBARTON BURGH BILL.—Read third time, with the amendments; a further amendment made; bill passed, and sent to the Commons.

UXBRIDGE AND HILLINGDON GAS BILL.—Returned from the Commons, with the amendments agreed to, with an amendment.

TROWBRIDGE WATER BILL.—Returned from the Commons, with the amendments agreed to.

MONDAY, JULY 7.

The following bills received the Royal Assent by commission:—

Gas and Water Provisional Orders Confirmation (No. 2).	The Gaslight and Coke Company.
Belfast Gas.	Newcastle-upon-Tyne and Gateshead
Atherton Local Board.	Lincoln Gas. [Gas.
Durham Gas.	Briton Ferry Local Board.
Portsmouth Borough Water.	Brighton and Hove Gas.
Barrow-in-Furness Corporation.	Doncaster Corporation Water.
	Trowbridge Water.

UXBRIDGE AND HILLINGDON GAS BILL.—Commons amendment to Lords amendments considered and agreed to.

TUESDAY, JULY 8.

GLASGOW CORPORATION GAS BILL.—Read third time, and passed.

GAS AND WATER WORKS FACILITIES ACT (1870) AMENDMENT BILL.—A bill to extend and amend the provisions of the Gas and Water-Works Facilities Act, 1870, was presented by the Earl Cowper, which was read first time, and ordered to be printed, and to be read second time on Friday, July 11.

GOSPORT GAS BILL.—Returned from the Commons agreed to.

DEWSBURY AND BATLEY CORPORATIONS GAS BILL.—Returned from the Commons with the amendments agreed to.

POLLUTION OF RIVERS BILL.—Message from the Commons, giving leave to James Cochran Stevenson, Esq. (a member) to attend the Select Committee on this bill. A petition against this bill was presented from the inhabitants of Forfarshire.

THURSDAY, JULY 10.

ALKALI ACT, 1863.—Ninth annual report, by the inspector, of his proceedings during 1872, was presented.

GAS COMPANIES.—Petitions against the amalgamation of, were presented from ratepayers of the metropolis.

POLLUTION OF RIVERS BILL.—A petition against this bill was presented from the inhabitants of Stirling, &c.

FRIDAY, JULY 11.

NOTTINGHAM GAS BILL.—Reported with amendments.

BRADFORD IMPROVEMENT BILL.—Returned from the Commons, agreed to, with amendments.

DUMBARTON BURGH BILL.—Returned from the Commons with the amendments agreed to.

THE GAS AND WATER WORKS FACILITIES ACT, 1870, AMENDMENT BILL.

Earl COWPER: My lords, I rise for the purpose of moving the second reading of this bill, which has become necessary in consequence of the great increase which has taken place in the price of coal. Its object is to give to the Board of Trade power to grant Provisional Orders enabling the companies to increase their rates, and the enactment for that purpose will be found in the 7th clause, as follows:—"Where, with a view to prevent undue loss to any undertakers arising from unusual increase in the cost of production of gas, or to the prevention of undue accumulation of profits by undertakers, it appears to the Board of Trade expedient and proper that the application should be granted, with or without addition or modification, or subject or not to any restriction or condition, and it has been proved to their satisfaction that all the requirements of this Act have been in all respects complied with, the Board of Trade may settle and make a Provisional Order accordingly; provided that the operation of such Provisional Order shall be limited to such period (not exceeding three years) as the board shall therein prescribe. Provided also, that where any addition shall be made by any such Provisional Order to the maximum price of gas prescribed by the special Act, provision shall be made by such Provisional Order that the undertakers, being a person, company, or companies carrying on business under the special Act for his or their own pecuniary benefit, shall not divide more than at the rate of 5 per cent. per annum on their ordinary capital for any half year in which they shall have charged more than the maximum price prescribed by the special Act, or if such undertakers shall not have paid a dividend of 5 per cent. on such capital for the two financial years next preceding the application, more than such sum as shall have been the average amount of the dividend in such two years; and before allowing any such addition the Board of Trade shall ascertain the amount of dividend paid on such capital during the said two years, the contracts, if any, for coal still in force, the present and former prices received by them for coke and residual products, the amount of gas unaccounted for and lost during each of the said two years, and their charges for gas during the same period." This is no doubt a large power to confer upon the Board of Trade, but there are provisions in the bill that the fullest notice shall be given, and if any noble lord should think that more requires to be done in the way of precaution, I shall endeavour in committee to meet his wishes in every possible way. I trust that your lordships will allow that the bill goes no further than to give the companies a fair guarantee against loss, and to allow the same small profit. If no profit were permitted, I fear that in some cases the works would break down altogether, and that great inconvenience would be caused to the public. I hope your lordships will therefore agree to the second reading.

Lord REDESDALE: My lords, I think that this bill will require a great deal of consideration, because I confess I do not think it is a safe precept for Parliament to set up, that directly companies cease to make a profit they have a right to come and ask to have their rates raised. I think a general Act based on that principle is of doubtful propriety. I admit that there are cases where if no profit were made the works would be closed, and great public inconvenience would result; but I doubt the policy of laying down the principle that gas companies are to make at least 5 per cent., and are not to take their fair chance of profit and loss.

The Duke of RICHMOND: My lords, I am not going to offer any objection to the second reading; but I must say I think it very inconvenient that we should be called upon to consider a measure of such importance when it was only delivered to us this morning. No doubt, at this period of the session, some haste may be necessary, but still in the case of a bill which contains such very strong provisions, some further time should have been allowed us. I agree to a certain extent with the views expressed by my noble friend the Chairman of Committees (Lord Redesdale); but if he will read clause 7, he will find it there stated that the ground on which the Board of Trade is to act is, "to prevent undue loss to any undertakings arising from unusual increase in the cost of production of gas, and to prevent undue accumulation of profits by undertakers." The company which applies for a Provisional Order will, therefore, be called upon in the first instance to show that the condition of things under which they make their application has been brought about by unusual increase in the cost of production of gas. Two years ago the price of coal was 15s. a ton, whereas it is now, I suppose, 35s.; and it is, I think, perfectly obvious that if under such an exceptional state of things you do not allow an increase of rates, gas cannot be made at a profit. At the same time the bill proposes to confer upon the Board of Trade a most extraordinary power; in fact, such a power as has never yet been given to a department of the Government—no less a power, in short, than to make what will virtually be an Act of Parliament, for you are going to give it power to issue Provisional Orders which will have all the force of Acts of Parliament, and they will come into force at once. It is true that Parliament may hereafter say whether or not an order is to continue; but Parliament cannot step in and say, "This order is not a proper one, and it shall not take effect." The order will have, in fact, to all intents and purposes, the force of an Act of Parliament from the moment it is made. Now I want to be thoroughly understood. I think that the present bill ought not to be drawn into a precedent, for I hold that such a precedent would be a most dangerous one; but I think legislation is decidedly necessary. I know a place in Scotland where the authorities are bound to supply gas at certain rates at which it cannot possibly be produced. Thus the whole community would be rated to supply gas, and a great many people who did not use it would be compelled to contribute for the benefit of those who did; therefore I think that some such bill is necessary, and I hope that with the safeguards which it contains, and always providing that it is not to be a precedent, it may not only be passed without injury to the public, but I hope it may be found very useful to it. Indeed, I myself took the liberty of suggesting, at an earlier period of the session, that the difficulty might be met by a system of Provisional Orders.

The bill was then read a second time.

HOUSE OF COMMONS.

MONDAY, JUNE 30.

BRIGHTON AND HOVE GAS BILL.—Lords amendments agreed to.

BRITON FERRY LOCAL BOARD BILL (Lords).—Read third time, and passed.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Petitions for alteration were presented from Worcester, Monmouth, York, Wellington, Runcorn, Barnsley, Penistone, Wandsworth and Putney, Brighton, Birmingham and Staffordshire, Hartlepool, and Bournemouth.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Second reading deferred till Thursday, July 3.

TUESDAY, JULY 1.

MUNICIPAL CORPORATION (BOROUGH FUNDS) BILL.—Petitions for alteration were presented from the Bristol United and Cambridge University Gas Companies; and in favour from Liverpool and Kidderminster.

WEDNESDAY, JULY 2.

DONCASTER CORPORATION WATER BILL.—Lords amendments agreed to.

MUSSELBURGH AND DALKEITH WATER BILL (1871).—Ordered that the minutes of the evidence taken before the committee on the Musselburgh and Dalkeith Water Bill in session 1871 be referred to the committee on the Mid-Lowthian Water Bill.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—A petition for alteration was presented from the St. Albans Gas Company.

THURSDAY, JULY 3.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Petitions for alteration were presented from Manchester and Mitcham.

GOSPORT GAS BILL (Lords).—Reported, without amendment; to be read third time.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Second reading deferred till Monday, July 7.

FRIDAY, JULY 4.

TROWBRIDGE WATER BILL.—Lords amendments agreed to.

UXBRIDGE AND HILLINGDON GAS BILL.—Lords amendments agreed to, with an amendment.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Petitions for alteration were presented from the Staines and Egham District, and Poole Gas and Coke Companies.

MONDAY, JULY 7.

Gosport Gas Bill (Lords) read third time, and passed.

Bradford Improvement Bill (Lords), as amended, considered; to be read third time.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Petitions for alteration were presented from the Newport, Sunderland, Barnet, and Cleator Moor Gas Companies; the Brompton, &c., Water-Works Company; and the Corporations of Leeds, Bootle-cum-Linacre, and Salford.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Second reading deferred till Thursday, July 10.

POLLUTION OF RIVERS BILL.—Leave was given for Mr. James Cochran Stevenson (a member) to attend and give evidence before the Lords Committee on this bill.

DEWSBURY AND BATLEY GAS BILL.—Mr. CHARLES FOSTER gave notice that on the consideration of the Lords amendments to this bill, he would move—"That the order of the 24th of February—that the bill be committed—be read and discharged; that the bill be withdrawn."

Mr. WILBRAHAM EGERTON gave notice that on Thursday, July 10, he would ask the President of the Local Government Board when the report of the inspector under the Alkali Act would be presented; and whether any special inquiry had been or will be made respecting other works giving out injurious gases, so as to enable them to be brought under the Alkali Act.

TUESDAY, JULY 8.

DEWSBURY AND BATLEY CORPORATIONS GAS BILL.—Lords amendments agreed to.

DEWSBURY AND BATLEY GAS BILL.—Order of the 24th of February, that this bill be committed, read, and discharged. Bill withdrawn.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Petitions for alteration were presented from Birmingham, Liverpool, York, and Meath, from the Wrexham Gaslight Company and the Fleetwood Gas Company.

NOXIOUS BUSINESSES.—Report of Select Committee, with minutes of evidence, brought up, read, and ordered to be printed.

WEDNESDAY, JULY 9.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Petitions for alteration were presented from Fareham, Portsmouth, and Wigan; and in favour, from Middlesborough.

MID-LOTHIAN WATER BILL (Lords).—Reported, with amendments.

THURSDAY, JULY 10.

DUMBARTON BURGH BILL.—Lords amendments agreed to.

BRADFORD IMPROVEMENT BILL (Lords).—Read third time, and passed, with amendments.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Petitions in favour of, were presented from Chester, Dewsbury, and Newport.

ALKALI ACT, 1863.—Copy of ninth annual report of the inspector, for 1872, was presented.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.

On the order of the day for the second reading of this bill being called,

Mr. FIELDEN asked when it was proposed to proceed with the bill.

Mr. HIBBERT said he hoped to be able to move the second reading on Monday, the 14th.

FRIDAY, JULY 11.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—Petitions for alteration were presented from Maidstone, and in favour from Gloucester.

HOUSE OF COMMONS.

THURSDAY, JUNE 26.

(*Before the Lord* MARCH, *Chairman; Mr.* THOMAS CASE, *Mr.* H. M. FEILDEN, *Mr.* JOHN HAMILTON, *and Sir* JOHN DUCKWORTH, *referee.*)

BRADFORD IMPROVEMENT BILL.

Mr. DENISON, Q.C., Mr. CRIPPS, Q.C., and Mr. LITTLER, Q.C., appeared for the Bradford Corporation; and Mr. RICHARDS, Q.C., Mr. MICHAEL, and Mr. WEBSTER for the petitioners against the bill.

Mr. DENISON, Q.C., in stating the objects of the bill, said that it contained certain provisions for the improvement of the town of Bradford. When before the House of Lords it occupied a very considerable time. The case was somewhat altered now, inasmuch as a great deal of the opposition had been withdrawn; but as it was still opposed by different people it would be better to take one opposition at a time, and he should therefore propose in the first place to deal with the portion relating to the gas company. In order to make the matter clear, it was necessary to inform the committee that by the bill it was proposed to extend the borough of Bradford to the village of Bolton, which, for municipal purposes, would, after the bill became law, be incorporated with Bradford. The Local Board of Bolton, when the bill was before the House of Lords, had opposed the proposal of the Corporation of Bradford to incorporate the township. But they had now withdrawn their opposition, and would, in the event of the bill passing, have the benefits of the drainage and water supply of the borough of Bradford—things which they could not do themselves. By the extension of the borough limits so as to include Bolton the promoters would have powers to break up the streets for gas and other purposes. Some time ago the corporation supplied Bolton with gas, but the time came when the two companies, which also supplied the adjoining districts, obtained an Act of Parliament and became incorporated. The Shipley and Eccleshill Companies now held that in the event of the Corporation of Bradford extending their area to Bolton they would suffer considerably. But this was really one of the districts of the corporation, as it was only in 1871 that these two companies had obtained their Acts, and in those Acts there was no word whatever which excluded the corporation from supplying gas, the only thing against them being that they had not power to break up the roads without the consent of the local board. The gas companies now appeared to be under the impression that they had a monopoly by the passing of the Act of 1870, the corporation having no such corresponding Act. But this was an entire mistake, for if they went to the Court of Chancery to obtain an injunction against the corporation for supplying residents in Bolton with gas, they could not get such order from that court. This rule had been decided by the judgment in the case of the Corporation of Bradford and the Pudsey Gas Company, for Lord Westbury, or whoever it was gave judgment, said that the real question was whether an outsider had a right to supply in another district, and he held that although much might be said on the point, it was quite clear that the gas company should not create any nuisance; but there was nothing to prevent them from supplying gas just as they liked, so long as they did not cause inconvenience. Such was now the case with regard to the two companies petitioning against the bill, who had, he thought, no right to be heard in any court of law against the corporation executing gas-works in Bolton.

Mr. MICHAEL said that it was quite within the power of a ratepayer to appeal to the Court of Chancery. A single inhabitant of Bolton could prevent the Bradford Corporation from breaking up the streets.

Mr. DENISON then proceeded to argue, with reference to the Shipley Gas Company, that they really had no grievance against the corporation; and with regard to the Eccleshill Company, the cost of their laying down mains in Bolton only amounted to £128. The whole theory of his learned friend was that there had been created a legal gas monopoly, and that by their bill the corporation would altogether extinguish the existing competition. There was before the Lords a question as to the price of the gas which would be supplied by the corporation to Bolton, and it had been asserted that the corporation could supply the gas for about 1s. 6d. per 1000 less than the existing companies could. He (Mr. Denison) was now prepared to meet that difficulty by inserting a clause which would remove this complaint. The corporation were also willing to pay for the pipes of the company at a fair rate, but not with regard to any prospective improvements which might take place in the additional supply which Bolton would require in time to come.

The CHAIRMAN asked if there was any objection to the preamble.

Mr. DENISON said he would before the point was decided bring up a witness or two to prove it.

Mr. *M. W. Thompson*, mayor of Bradford, was then sworn, and said he was formerly member of Parliament for the borough of Bradford, and was now deputy-chairman of the Midland Railway Company. He had resided for many years in Bradford. The preamble was quite true with regard to both water and gas. It recited that Bolton should for municipal purposes be incorporated with Bradford. The Corporation of Bradford were suppliers of gas to the town, with the exception of some private roads and houses which were supplied by Mr. Ripley. They had bought up the old gas company in 1871 for £270,000. The question of the supply of gas to Bolton raised considerable discussion in the House of Lord. The Bradford Gas Company had supplied the houses of Bolton with gas prior to 1870. He was in favour of giving compensation to the existing companies for gas-pipes, and he was also prepared to consent to a clause not to charge less for gas in Bolton than they would in Bradford. He believed the corporation could supply better gas to Bolton than they now got from the companies.

Mr. *Swallow*, gas engineer to the Corporation of Bradford, was called, and said that the Eccleshill Company was first started in Eccleshill, and not in Bolton. They supplied certain of the inhabitants of Bolton with gas, but that was before they were incorporated. At present they supplied very few of the houses with gas. By the Bradford Gas Company's Act of 1845 the company had power to supply Bradford and towns in the neighbourhood, and in 1864 the old gas company began to supply Bolton with gas. They did this in consequence of a memorial of certain inhabitants of Bolton who asked them to do so, and the gas companies then commenced laying pipes in certain districts in Bolton, and across some fields to Mr. Jowett's property. The public lamps had only been placed in Bolton this present year, and in consequence of the promotion of the present bill. Some of the lamps which were erected had no mains to them, and were never lighted. He believed the Eccleshill Company had paid about £128 8s. for mains. The Shipley Gas Company got their bill in 1871, but the district they were empowered to supply was chiefly an agricultural one.

Mr. *Woodhead*, surveyor, of Bolton, was next called.

Sir JOHN DUCKWORTH: Is this witness going to prove the preamble?

Mr. DENISON hoped his learned friend would not raise a technical objection to the preamble.

Mr. MICHAEL said no other course was open to him than to address the committee on the preamble.

Mr. *Woodhead's* evidence was then proceeded with. He said the Shipley Gas Company supplied a mill, a slaughter-house, and about thirty cottages. The Eccleshill Gas Company supplied no mill or factory, but probably some five or six residences, and 30 or 40 cottages. The public lamps had been put up since notice had been given of this bill. There were no public lamps before.

By Mr. MICHAEL: He could not say what was the total quantity of gas supplied by either company.

Mr. DENISON: Is any gas supplied to the public lamps?

Witness: There is now, I believe. Several were lighted for a few nights only; but there are some lamp-pillars put up in places where no mains are laid down. They were put up by the local board; but there is no connexion between them and the mains.

Mr. DENISON intimated that this was all the evidence he intended to call in support of the preamble.

Mr. MICHAEL, on behalf of the two gas companies, addressed the committee and said that the question for the committee to consider was what would be the position of the gas companies in the event of this Act becoming law. At the present time the borough of Bradford had the right to supply gas to the borough and beyond its limits, and they now proposed to supply Bolton precisely in the same way as they supplied gas within the limits of the borough, and they would, therefore, virtually become a competing company. Parliament had on various occasions refused to sanction public rates being used in competition with private enterprise, and he hoped that it would not depart from this principle now. It would be impossible for these two little companies to maintain their position in opposition to so powerful a concern as that of the corporation. If the bill passed, full compensation ought to be made, and the value of the companies mains and pipes settled by arbitration; the award being given under the rules and provision of the Lands Clauses Consolidation Act. The value of material had increased very much of late years, and certainly the companies ought to have the benefit of this, and their pipes and other property should be sold at, say, 20 years purchase.

Mr. DENISON said so far as the price of material was concerned, he was quite willing to make some arrangement.

Mr. HAMILTON: Had your company a special Act to go into Bolton?

Mr. MICHAEL: Yes.

Mr. DENISON: But they were there before they got any Act at all.

Mr. MICHAEL: Yes, we were there, but any one might have stopped us.

Mr. HAMILTON: Did the Act you got refer specially to Bolton.

Mr. MICHAEL: No, not to Bolton alone.

Mr. DENISON said this was not a question of buying up a company, but only a slice of a company.

After some further discussion, the chairman said the committee were of opinion that the preamble had been proved.

Mr. DENISON then referred to clause 47, upon which Mr. Michael had founded his arguments against the bill, and argued that the companies were not entitled to anything like the amount or kind of compensation which they now sought to obtain.

The room was then cleared, and on the door being reopened,

The CHAIRMAN said the committee thought that another clause should be

framed in place of clause 47, which should provide for compensation for the pipes and mains of the existing supply of gas in the district.

Mr. MICHAEL: Perhaps the committee will allow me to bring up a clause to-morrow morning.

The CHAIRMAN: Yes, that will be more convenient. Of course the clause will bind over the corporation to buy the pipes, and it will equally bind over the companies to sell.

FRIDAY, JUNE 27.

Mr. LITTLER announced that he had been able to come to terms with the petitioners with regard to the gas clauses. Each party had proposed a clause, and it was resolved to take half of each. It would run as follows:—"Within six months after the passing of the Act the corporation shall purchase, and the said company shall sell all the pipes and mains laid by the said companies, in the township of Bolton, for the supply of gas, such purchase to include the profits arising to the said companies from the gas at present supplied by them in the said township, through the said pipes and mains. And in case of any difference arising as to the amount to be paid to the said companies, or either of them, such amount shall be determined by Thomas Hawksley, C.E., as sole arbitrator, and failing him, by one arbitrator to be appointed by the president for the time being of the Institution of Civil Engineers, and the cost of and incident to the arbitration. And such cost, in case of difference, shall be settled by one of the masters of the Court of Queen's Bench, and on payment of the amount of compensation to the respective company, the gas mains and pipes of such company in the said township shall rest with the corporation, and the portion of the township of Bolton within the gas limits of the respective company shall thereupon cease to be part of gas limits."

The committee having consented to the clause, the other portions of the bill were proceeded with.

Legal Intelligence.

EDINBURGH COURT OF SESSION.—WEDNESDAY, JULY 9.

(*Before Lord* ORMIDALE.)

THE GASLIGHT AND COKE COMPANY *v.* JAMES FERGUSON AND CO. AND OTHERS.

Mr. MILLAR, Q.C., Mr. BALFOUR, and Mr. MACINTOSH appeared for the plaintiffs; the SOLICITOR-GENERAL, Mr. WATSON, and Mr. ASHER for the defendants.

This was an action by The Gaslight and Coke Company, London, against Messrs. James Ferguson and Co., coalmasters, Auchinheath, for payment of £2200 as loss or damage sustained by them through an alleged breach of contract. The plaintiffs stated that they had for a number of years past used in the manufacture of gas coal known as Lesmahagow gas or cannel coal, the best of which was obtained from seams in the parish of Lesmahagow. In the month of February, 1870, the existing contracts between Messrs. J. Laurie and Co., as the authorized agents of the firm of Ferguson and Co., and the plaintiffs for the supply of Lesmahagow gas or cannel coal, were revised, and an agreement was entered into, under which the defendants agreed to furnish 30,000 tons of such coal at 25s. per ton, f.o.b. at Granton, net cash. Of this quantity the plaintiffs were to take delivery of 25,000 in 1870, and the remaining five tons at the beginning of the following year. They stated that from the latter part of December, 1870, onwards, they began to find that the coal was not of the description or up to the quality contracted for; but that, on the contrary, many of the consignments of coal were of a greatly inferior description and quality, so that it was necessary to carbonize a much larger weight of the coal sent in order to produce the quantity of gas of the illuminating power furnished by proper Lesmahagow gas or cannel coal. They stated further that the coals were mixed by the defendants in wilful and deliberate breach of their contract with the plaintiffs, and that, through this alleged breach of contract, they had suffered loss to the amount claimed. For the defendants it was stated that no complaint of the quality of coal supplied was made until the beginning of January, 1871, when about 20,000 tons had been delivered; and they declared that the whole of the coal supplied by them to the plaintiffs was of the description contracted for, and all of good quality, although a very small quantity appeared to have been taken from near "troubles" in the seam. The plaintiffs had taken up the erroneous impression that the coals raised from the main cannel seam in Craignethan were not Lesmahagow cannel coal, and had insisted that the coals to be delivered to them should be raised from the main seam in Auchinheath. The defendants maintained that they were under no obligation to comply with this demand, as, in point of fact, the same seam ran through both lands, and the name "Lesmahagow cannel coal" was equally applicable to the coals raised in both. They defended the action on the grounds that the statements of the plaintiffs were unfounded in fact; and that, the plaintiffs having taken delivery of, retained, and used the coals in question, they were not entitled to claim damages in respect of the alleged breach of contract. Evidence having been given, the Lord Ordinary issued an interlocutor, finding that the plaintiffs had failed to prove their grounds of action, and acquitting the defendants from the allegations of the summons. His lordship finds the defendants entitled to expenses. In a note his lordship says that he can find nothing in the proof to support the very serious charge made by the plaintiffs, that the defendants mixed their coal "in wilful and deliberate breach of their contract with the pursuers." The evidence of the defendants managers negatives anything like fraudulent or improper conduct on their part; and William Forrest, who had been their underground manager for 30 years, states that they were in "the practice of sending off coals from Craignethan, and also from Auchinheath, to the same ship for loading," and he further says "that in doing so he never doubted they were sending off Lesmahagow coal; that there was no concealment or attempt to palm off one instead of the other; and that it was the open and undisguised practice of the colliery to send both coals promiscuously for shipment as Lesmahagow coal." The Lord Ordinary can therefore see no ground whatever for supposing that, whether the defendants were wrong or right in sending to the plaintiffs coal from their Craignethan as well as their Auchinheath pits, they did so "in wilful and deliberate breach of their contract with the pursuers."

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.—The petitions presented to Parliament against the Municipal Corporations (Borough Funds) Bill are for the most part copies of that which has appeared in our JOURNAL, but the petition of the Birmingham and Staffordshire Gas Company has the following in addition, which seems deserving of some attention, although it would not be consistent with the practice of Parliament to insert such a provision in the bill now before it:—"At present there is no audit, nor any practical check or control on the expenditure of municipal corporations and local authorities; and, apart from the injustice that may be done to your petitioners by the unlimited powers sought to be vested in corporations and local authorities, your petitioners are, as already stated, greatly interested in the rates not being wasted in parliamentary conflicts without any control on the proceedings; and your petitioners, therefore, humbly submit that if any fresh powers are given, or if powers are retained to corporations and local authorities as is contemplated by the bill, it should only be on condition that stringent provisions are made for a complete and effectual audit and control of their expenditure and accounts, similar in character to those already in existence with reference to the expenditure and accounts of boards of guardians and school boards."

Miscellaneous News.

AMENDED INSTRUCTIONS BY THE GAS REFEREES.

The gas referees have made the following supplementary announcement as to the sulphur maximum:—

"For gas made at Beckton and Bow, the maximum shall remain fixed at 20 grains.

"But the referees have determined, in consideration of various difficulties which the gas companies have encountered, in attempting to reduce the amount of sulphur below 20 grains at works less favourably situated, to allow at these works, from this date until the 30th of September, a maximum of 25 grains.

"During the winter half year, it is the intention of the referees, in further consideration of the increased quantity of gas which the companies have to make, to raise the maximum to 30 grains.

"But the referees wish it to be understood that they sanction these maxima for the periods named, only because it appears that at several gas-works the purifying apparatus is on an insufficient scale, and in the hope that the time thus granted will be used by the companies in making such additions and improvements as will secure to the public a higher standard of purity for the future.

"A. VERNON HARCOURT.
"WILLIAM POLE.

"17, *Buckingham Street, Adelphi, W.C.*,
"*June* 30, 1873."

METROPOLIS GAS SUPPLY.

PADDINGTON VESTRY.—At a meeting held on the 1st inst., a report was received from the Highway Committee recommending that, inasmuch as the contract now existing between this vestry and the Imperial Gaslight and Coke Company will terminate on the 30th inst., and the time afforded to this committee not having enabled them to adopt the necessary means for obtaining satisfactory tests in regard to the meter system, the vestry do accept the terms set forth in the letter received from the above-named company on the 16th day of May last. The committee also presented a recommendation that the committee be empowered to make further inquiries and experiments with reference to the adoption of the meter system for the supply of gas to the public lamps. Some discussion took place as to whether further steps ought not to be taken to test the meter system, but eventually, on the motion of Mr. Davenport, it was resolved to submit to the increased charges imposed by the gas company.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in the parish of Marylebone:—

JUNE, 1873.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrogen.
	*Mean of 22 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas	16·70	17·80	15·91	23·77	10·08	29·69	0·26	None.
Chartered Company's common gas	17·04	18·40	16·40	26·25	12·64	14·43	0·26	None.
Chartered Company's cannel gas	24·49	25·80	22·50	22·61	11·07	21·77	0·33	None.

Mean of daily readings of barometer . . . . 29·84
" " " thermometer . . . 68·48

* Each observation consists of ten readings of the photometer, at intervals of one minute.

During the month the mean illuminating power of the Imperial Company's gas was equal to the light of 16·7 candles; it ranged between 15·91 and 17·80 candles; four times it exceeded 17 candles. The mean amount of sulphur in 100 cubic feet of this gas was 29·69 grains, and of ammonia a quarter of a grain. The mean light of the Chartered common gas was equal to 17 candles; it ranged between 16·40 and 18·40 candles; twice it exceeded 18 candles; the mean quantity of sulphur found was 14·43 grains, and of ammonia a quarter of a grain. The mean light of the cannel gas was equal to 24·49 candles; it ranged between 22·50 and 25·80 candles; seven times it exceeded 25 candles. The mean quantity of sulphur contained in it was 21·77 grains, and of ammonia the third of a grain. The pressure of all the gases was fair, and on no occasion was sulphuretted hydrogen detected by the ordinary tests. The above results were obtained from the common gas of the Chartered Company, manufactured at their Beckton and Bow works, and from the Imperial Company's gas, manufactured at their Fulham works.

METROPOLIS WATER SUPPLY.

The Registrar-General publishes the following returns furnished to him by the London water companies, of the average daily quantity of water supplied during the month of May, 1873:—According to their returns, 115,893,425 gallons, or 526,557 cubic metres of water (equal to about as many *tuns* by measure, *tons* by weight), were supplied daily; or 230 gallons (104·6 decalitres), rather more than a *ton* by weight to each house, and 32·4 gallons (14·7 decalitres) to each person. According to returns of the London water companies made to the select committee on East London Water Bills (session 1867), it is estimated that, during the year 1866, about 82 per cent. of the total supply of water for all purposes was for domestic use; applying this proportion to the total quantity supplied daily in the month of May, 1873, it may be estimated that about 95,032,609 gallons were probably used for domestic purposes, or about 26·6 gallons per day for each inhabitant, against 25·1 in the corresponding month of last year. This proportion no doubt varies from month to month, but the Registrar-General has no means of giving a more exact estimate.

COMPANIES.	Number of Houses, &c., supplied in		Aver. Daily Supply of Water in Gallons* during	
	May, 1872.	May, 1873.	May, 1872.	May, 1873.
Total supply	496,099	503,562	107,859,997	115,893,425
From Thames	231,370	235,854	57,072,058	60,520,925
" Lea and other Sources . .	264,729	267,708	50,787,939	55,372,500
THAMES.				
Chelsea	28,154	28,270	8,840,000	8,442,800
West Middlesex	45,398	44,690	9,792,872	9,644,086
Southwark and Vauxhall . . .	78,365	79,236	16,420,408	17,786,818
Grand Junction	33,013	34,243	11,685,878	12,290,271
Lambeth	47,940	49,415	10,332,900	12,357,000
LEA AND OTHER SOURCES.				
New River	120,107	121,135	23,919,000	25,369,000
East London	103,513	104,637	19,947,600	23,312,600
Kent	41,109	41,936	6,921,339	6,690,900

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for May, 1873, as compared with that for the corresponding month of 1872, shows an increase of 7463 houses, and of 8,033,428 gallons in the daily supply of water.

Dr. Frankland, F.R.S., reports that the waters supplied during June by all the metropolitan water companies were clear when drawn from their mains. Taking unity to represent the organic impurity in a given volume of the Kent Company's water, the proportional amount in the water supplied by each of the other metropolitan companies was:—New River, 1·6; East London, 2·8; West Middlesex, 3·0; Chelsea, 3·1; Southwark, 3·2; Grand Junction, 3·4; and Lambeth, 3·5. Although the river waters show the improved quality which is usual during summer, they are "still much inferior to the Kent Company's water," obtained from deep chalk wells. The evidence of previous sewage or animal contamination is greatly reduced in the water supplied by the West Middlesex, Southwark and Vauxhall, and East London Companies, through their larger storeage capacity enabling them to allow their water to stand for a few days previous to delivery.

Dr. Whitmore's report on the composition of the Thames companies and other waters as supplied in Marylebone:—

June, 1873.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by incineration of Solid Matter in previous column.		Hardness before boiling in degrees.	Hardness after boiling in degrees.
	June, 1872.	June, 1873.	June, 1872.	June, 1873.		
Distilled Water . . .	0°	0°	0°	0°	0°	0°
West Middlesex water .	17·31	18·68	0·68	0·84	13·72	3·02
Grand Junction water. .	17·54	19·02	0·72	0·86	14·00	3·04

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

During the month the water supplied to the parish was bright and colourless. There was a slight excess of solid matter in the water of both companies, as compared with the corresponding month of last year.

Metropolitan Board of Works.

At the Meeting of this Board on Friday last—Col. Hogg, M.P., presiding,

Mr. Runtz moved—"That it be referred to the Works and General Purposes Committee to inquire and report to the board what, if any, steps have been taken by the water companies to give practical effect to the Metropolis Water Act, 1871, and the regulations of the Board of Trade under that Act, and also to report whether, where the constant supply has been introduced, all the regulations and other arrangements with reference to fittings have been adopted, and if so, at what average expense per house, and further to report whether, in any instance, storeage cisterns have been dispensed with." He said all present would admit that the subject was one of the greatest possible importance. The Legislature had, for a period of twenty-six years, been continually endeavouring to give to the metropolis a constant supply of water; and so far back as the Act of 1847 it was proposed to be given. In 1850, 1852, and 1869 a Royal Commission sat; and when their report was presented it was shown that the intermittent system was comparatively wasteful. The Government in 1871 introduced a bill, in which it was proposed to give this board very considerable powers over the water companies; but mainly through the interest of the water companies it met with such unexpected opposition that it was hastily withdrawn, and for it was substituted what was then called Bill No. 2, and which was now called the Water Act of 1871. The Metropolitan Board, in the interests of the ratepayers, interfered with the bill becoming law, and opposed it at every stage. He believed they spent nearly £2000 in the opposition. The power given to the board was very limited. There were three ways in which a constant supply of water could be obtained under the Act—1st, the company by their own action could give it; 2ndly, by the action of that board; and 3rdly, the Local Government Board had authority to order the constant supply if this board failed to do its duty under the Act. They had received notice from two companies of their intention of giving a constant supply, the first being from the East London Water Company, who at first proposed to apply constant service in a poor district, and by subsequent letters showed that they were extending the application of the system; they had also received notice from the Kent Water Company that after July 1 they intended to give a constant supply in the parish of Saint Mary, Rotherhithe. There there were two companies giving a constant supply to certain portions of their districts, and it was important to remember that the Metropolitan Board and the companies had always been at issue as to the meaning of a constant supply. The board had contended that there should be pipes containing no obstructions, of half an inch diameter. They desired the outlet to be perfectly free. The companies had considered it consistent with a constant supply to let the water dribble so that it took half an hour to fill a pail. They had also to consider the new arrangements as to fittings, and especially whether filthy cisterns were still to be used. It was advisable they should have information upon these points, as well as whether the regulations required had been complied with. At the present time two companies had given them notice of their intention to adopt the constant service. He thought they should be able to show that legislation upon the subject had hitherto been defective. The motion simply aimed at getting proper information. There could be no question as to the good which would result if a wholesome water supply could be continuously given in the metropolis.

Mr. Freeman seconded the motion.

Mr. Beven said with respect to the impediments to the free passage of the water through the pipes, that ferrules, so far as he knew, were not used as had been stated.

The motion was put and agreed to.

Mr. Runtz then moved—"That it be referred to the Works and General Purposes Committee to inquire and report in what district of the metropolis the mains for the supply of water are now constantly charged, and whether in such cases it is expedient to adopt hydrants or other improved means of obtaining a speedy supply of water in case of fire, and to report whether any communications upon this subject have been received from the companies supplying water to the metropolis." He said that at fires there were constant complaints of delay caused through difficulty in obtaining water. The complaints averaged about 100 a year, and during the last two years 200 complaints had been made to the metropolitan water companies of the existence of this state of things, and he thus thought the board should have its attention drawn to the subject. The notice of the board through the newspapers had been called more than once to the number of miles of mains charged with water. Mr. Morris, the engineer, had told them that there were 900 miles of mains constantly so charged, and the question arose whether hydrants should not be used. The subject was a serious one for the consideration of the board, as the water companies, by the last Fire Brigade Act, had power to enforce their use if necessary, and, after short notice, could supply them themselves, and charge the cost. He then alluded to a letter which had been received by the board from the East London Water Company, making complaints of the existing arrangements with respect to the water supply at fires, and said it was important that he should draw attention to that letter, as it contained charges which had never been answered, and upon which no action had been taken.

Mr. Newton: We acted as the solicitor advised.

Mr. Runtz said the question as to whether they should provide the hydrants was important, because if they were obliged to use them, it would entail a cost of some two millions of money. It was a question upon which they should have every possible information.

Mr. Phillips said this subject had already been referred to the Works Committee, but nothing had resulted. They had the statement of Mr. Easton, that the supply of hydrants sufficient for the metropolis could not be done under one million sterling. There was no question but that, if it could be adopted, it would be an admirable mode of extinguishing fires.

Mr. Richardson thought it should go clearly to the public that the board had no intention of incurring any expenditure such as that named.

Sir Wm. Codrington thought the more the board looked at the question of hydrants the less they would like them, as he was sure to supply a sufficient number for London, the cost would be six millions.

Mr. Newton agreed that they should get some information, but did not concur in some of the statements made, and especially as to the importance which had been given to the letter from the East London Water Company. Any person could see the reason why the company wrote in the way they had done; they had to supply turncocks gratuitously, and therefore felt it a grievance that hydrants were not supplied, which would save them all trouble. The company, however, were the possessors of a monopoly, in return for which they had certain duties to perform. They did not hesitate to avail themselves of the privileges of their position whilst they complained of its duties. As to the company placing hydrants, he thought there was some misunderstanding as to the meaning of the word hydrants, which in this instance might mean the provision of a pipe to supply the engine, and not to supersede it. He hoped it would not go forth that they had any intention of spending two millions of money, as he believed they had no such intention.

Mr. Runtz, in reply, said the question as to whether engines could be dispensed with by hydrants was an important general and financial question. He was of opinion that the Water Act of 1871 was a dead letter, and that they might be in a position to prove that was the reason he asked for the information.

The motion was put and agreed to.

COLCHESTER GAS COMPANY.

The Annual Meeting of this Company was held on Tuesday, June 24—Mr. J. B. Harvey in the chair.

The following report and statements of account were submitted:—

Your directors report that during the past year the interests of the company required at their hands unusual watchfulness and care. The sudden and unexpected rise in the price of coals, and the uncertain state of the markets at the beginning of last winter, naturally caused them much anxiety; and they regret to say with reference to the doubtful condition of the markets there have been no indications of any substantial change for the better.

For some time it seemed not improbable that the cost of manufacture of gas might be attended with a heavy loss, as the company have not power to increase their charge to consumers, and Parliament having fixed the maximum of 4s. 3d. per 1000 feet on the basis of the price of coals, materials, and labour, in 1866, the date of the Act of Incorporation, whereas the quotations for coals alone for the last twelve months have been, and still continue to be, nearly 100 per cent. above the contracts previously to 1872.

The doubtful and perplexing state of things at the close of 1871 induced your directors to accept a favourable offer for the supply of an adequate stock of coals, and the propriety of this step was fully justified by the subsequent quotation of advanced rates. To meet the engagements thus contracted, it became necessary, for a limited period, to obtain a temporary advance from our bankers. This circumstance, taken in connexion with the then uncertain aspect of affairs, made your directors extremely cautious as to the course they should take with reference to the question of an interim dividend. After anxious consideration they determined that it would not be consistent with a due regard for the company's interests to make payments on account of dividend which might be found at the close of the financial year not to be realized. Their duty to take this course seemed the more clear when they considered that whatever amount they paid, the money must be borrowed for the purpose. They feel confident that the course they adopted will have the full approval of the shareholders.

Last year the company were, to some extent, protected by their coal contracts; but this year the entire consumption must be provided for at the advanced rates, all authorities on the subject concurring in the opinion that the present prices of coals will be maintained for some time to come. Your directors therefore feel that they must be prepared for the coming year's working upon even more unfavourable terms, as to the cost of production, than in the past year. They have been mainly influenced by this consideration in dealing with the balance at their disposal; and they are glad to have it in their power, notwithstanding all drawbacks, to recommend a dividend of 5 per cent., free of income-tax, upon the entire share capital. This will leave a not exorbitant sum towards meeting present engagements, and any contingencies that may arise.

Considerable alterations and improvements have been successfully carried out for the more regular and complete purification of the gas, which has been maintained at its full maximum standard of lighting power and quality.

The directors who retire by rotation are Mr. Walter Johnson and Mr. George Joslin; and the retiring auditor is Mr. J. S. Barnes; all of whom are eligible for re-election.

Dr. *Capital Account, March 31, 1873.* *Cr.*

To Amount of capital as per last balance-sheet . .	£37,563 10 11	By Value of buildings, &c., comprised in plant . .	£37,563 10 11

Dr. *Trade Account.* *Cr.*

To Coals used	£5,390 1 0	By Gas rental for year ending March 31, 1873 . . .	£9,266 1 3
Wages	1,151 3 2	Coke ditto	2,152 14 0
Maintenance and repairs .	1,361 18 1	Tar and ammoniacal liquor ditto	194 5 2
Salaries	438 18 0	Waste lime and old metal .	24 18 6
Directors	200 0 0	Fittings and meters . .	258 3 3
Auditors	21 0 0		
Rates and taxes	565 2 9		
Fittings and meters . .	44 12 2		
Chalk and lime	79 15 7		
Balance of rents	62 0 0		
Law expenses	8 4 10		
Stationery and printing .	34 12 9		
Incidental charges . . .	57 6 10		
Bad debts	41 9 9		
Balance	2,439 17 3		
	£11,896 2 2		£11,896 2 2

Dr. *Profit and Loss Account.* *Cr.*

To Balance of last year's dividend	£1,640 0 0	By Balance from last year's account	£4,440 15 6
Interest	232 4 8	Trade account	2,439 17 3
Balance	4,988 15 1	Bad debts received . . .	0 19 6
		Dividend from fire office .	29 7 6
	£6,910 19 9		£6,910 19 9

The Chairman, in moving the adoption of the report and balance-sheet, said he would repeat the words of the directors in their report, that the business of the past year had required unusually great attention, watchfulness, and care. At the beginning of the year they had their fears very much excited as to the result of the year's working, on account of the high price of coal, and of all materials connected with the production of gas. They felt that they were not in a position to increase the price of their gas whatever might be the cost of production. They were not like some companies, incorporated under Act of Parliament, and having provisions giving an elasticity which they had not in regard to the charge of gas, and which could increase their price 6d. or 1s. per 1000 beyond their current charges. Nor were they like unincorporated companies, who were at liberty to increase the price as they pleased. They were bound by the maximum mentioned in their Act, and they could not increase it. The protection which they sought by incorporation was of course forced upon them, and it might be thought that they were not in so good a position as those companies which were not incorporated, and which were therefore more exposed to the erection of competitive works

and the introduction of rival companies than those which were incorporated; but he thought they must understand that just in proportion as the manufacture of gas became more hazardous and more expensive, on account of the large amount of capital required, arising from the increased price of coals, &c., the probability of rivalry was reduced, and he did not think the unincorporated companies were so much exposed to competition now as they were a year or two ago, when coals and other materials and labour were to be had at a much lower price. Feeling the importance of their position in regard to this question, the directors adopted this course; they put themselves in communication with the Gas and Water Companies Association, which was established for the purpose of obtaining parliamentary relief and powers, where necessary. This association appeared to have had the confidence of the principal gas companies in the kingdom, and they put themselves in communication with it, with the view of obtaining some legislative relief. A meeting was held in London, which was attended by 150 or 170 representatives of different gas companies, and he (the chairman) attended on behalf of their company. They had an interview with Mr. Chichester Fortescue, President of the Board of Trade, and the whole case was laid before him, and he was asked whether the Government would undertake legislation to relieve companies that might suffer embarrassment, or whether they would support a bill brought in by a private member. The result of the interview was not very satisfactory—they got no promise of help from that quarter, and he did not think, from Mr. Fortescue's replies, that he had made himself fully acquainted with the subject, or that the Government had really given it any serious consideration. Subsequently to that, the propriety was urged of preparing a memorial asking the Government to introduce a measure giving the Board of Trade power, after due investigation and satisfying themselves that the application was justified, to permit the raising the maximum price of gas temporarily. A memorial from this company was sent, and a reply was received from the Board of Trade stating that it had been decided at once to introduce a bill into Parliament to authorize, under certain circumstances, a deviation from the maximum price of gas supplied to companies and local authorities. So far it was satisfactory. It appeared from a return of the losses of gas companies through the rise in coal, materials, and labour, that Colchester was amongst the most favourable of them. He was happy that they were in this favourable position, and he would remark that although they had been in communication with the association he had referred to, and had memorialized the Government to pass an Act, he hoped and trusted that it would turn out that it would not be necessary for them to avail themselves of that Act. There would be nothing compulsory about it—it would be quite optional, and the company would not be required to go to the Board of Trade for the power unless they elected by resolution to do so. He would only allude to one other thing that pressed unfairly on gas companies. Some time ago resolutions were passed in the House of Lords on the motion of Lord Redesdale. It was a most unusual course for the Lords to anticipate legislation in the House of Commons, but these resolutions (which he read) pressed unfairly on gas companies, inasmuch as they provided that, however strong a case a company made out, and however clear might be the necessity for increasing the maximum price, if the relief was granted the company would not be allowed to pay more than 5 per cent. upon its capital. This was manifestly unfair, as they did not all start on the same footing—they were not all equally weighted. For instance, their maximum price of gas was 4s. 3d. per 1000, whereas in the Ipswich Company, whose make of gas was nearly double theirs, had a maximum of 5s. per 1000. Moreover, the Bury St. Edmund's Company had given notice of its intention to raise the price to 5s. 10d. per 1000. In the course of some further remarks, the chairman said the directors had been most anxious, in all they had done, to serve the best interests of the shareholders, and although they had memorialized Parliament, and extracted a promise that a bill would be passed to grant relief where necessary, they should one and all be only too glad if there was never any necessity for them to apply for the relief.

Mr. ROWAN (the company's manager and a shareholder) said that before adopting the report he would like to have the directors assurance that any steps contemplated by them seeking additional parliamentary powers, tending to increase the cost of gas to the gas consumers or ratepayers, would be submitted to the consideration of the shareholders, and trusted that he was in error in assuming that they (the directors) had already incurred liabilities to the extent of £100 in obtaining such assistance. He deprecated any such course as impolitic in the face of Lord Redesdale's resolutions, limiting to a maximum dividend of 5 per cent. all gas companies availing themselves of such questionable assistance. Further, he asked if they were prepared to bear the obloquy that would necessarily fall upon them in any attempt to charge 9d. or 1s. extra per 1000 feet, seeing that the profits of the undertaking had increased (notwithstanding that coals had cost them 100 per cent. more than on previous years) to £3339 17s. 3d., £900 of which had been already appropriated to the erection of new plant, and the balance left at their disposal being sufficient to pay 7 per cent. It was idle, he considered, for them to take the example of other gas companies, who from extravagances or mismanagement had been compelled, or are now contemplating increasing the cost to their customers of 10d. to 1s. per 1000 feet; as in our case 10d. to 1s. per 1000 feet would realize £1800 only, as against the sum of £2440, which now can be secured to the shareholders by efficient and economical management. The use of a superior coal, similar to that which they had used during the past year, had proved to them a source of profit to the extent of £1000 alone, as compared with the inferior sort used in previous years. He (Mr. Rowan) complained that this latter amount of the dividend, if now only 5 per cent., was not recommended to be paid instead of 7 per cent., which was unfair to a larger class of shareholders, who, like himself, had purchased their shares at a premium of 20 per cent., upon the faith that such dividends would (as it could in this instance) be maintained. For his part, he could not see the slightest necessity for carrying forward so large a sum as £800 to the assistance of next year, as making this sum the additional reserve alone arising from the improvements already effected upon their works, combined with skilful management, and the additional value of residual products, already assured them the sum of £2111, it was a dividend of 10 per cent. upon the old class of shares.

The CHAIRMAN, replying to Mr. Rowan, said there was no agreement with the Gas and Water Association for payment of ½ per cent. upon their rental; the expenses incurred would be defrayed by the companies in proportion to their ability to pay, the calculation being based on their rental.

Mr. ROWAN remarked that during the past year, notwithstanding that coals had increased in price, they had effected a saving of upwards of £1000 by using a certain quality of coal, the cost of which, though 2s. per ton less, was worth 3s. 10d. per ton more in the additional gas it gave per ton, and 1s. 8d. better in its illuminating power. They had also realized for their coke £900 more than in previous years, and next year he had no doubt they would realize £1700. These were the principal reasons why they were so favourably circumstanced, as compared with other companies.

Mr. H. S. GOODY did not rise for the purpose of seconding Mr. Rowan's proposition, but he thought this would be the proper time to make a remark or two with reference to the unfortunate notice issued by the directors at Christmas last, informing the shareholders that no interim dividend would be declared as usual. He certainly thought it would have been better if the directors had called the shareholders together on that occasion and given them the fullest explanation in the presence of the reporters, who, he was glad had that day been admitted to their meeting, because the remarks of the chairman as to what had been done could not otherwise have had the same extended publicity they would now. Mr. Goody remarked that the capital of the company amounted to £32,000, and he complained that all that was done in reference to the interim dividend at Christmas was confined to the directors, who only held about £2600 of that capital. It might have been all plain and straightforward to the minds of the directors, but he thought the other shareholders should not have been left in perfect darkness on the subject. He further dwelt upon this point, and said he was afraid that where gentlemen were continued in office as directors from year to year, without the introduction of any new blood, it gradually got to this—that the shareholders did not get the full particulars they ought to have; and before the meeting separated he intended, without any personal feeling towards any one of the directors, to move that, in order to avoid any unpleasantness about this question, the elections should for the future be by ballot. After some further remarks, he said he was glad to find they were to receive 5 per cent. dividend, and, under the circumstances, he could not vote for it being increased.

Mr. SHENSTONE said that although the shares held by the directors might only amount to the sum Mr. Goody had named—he thought it was more—some of them represented, although they were not actually the owners, many thousands more.

The CHAIRMAN said that, after all, a money qualification would not be the only requisite. As to the main point Mr. Goody had alluded to, he would say that the directors were only too happy on all occasions to act in accord with the shareholders, and if there had been any feeling of disappointment created by the course they had taken they would meet it with feelings of regret. They would have been only too glad to have had the assistance of the shareholders, but the point never occurred to them; as a matter of business they sent the circular out, and he was sure that if any similar circumstance arose the directors would be glad to put themselves in communication with the shareholders.

Mr. CATCHPOOL said the directors could not have told the shareholders at a meeting more than they told them in the circular. Immediately after the last annual meeting coals began to rise in price, and they purchased largely, and had to borrow £2000 to pay for them. Therefore if they had paid an interim dividend they must have borrowed more money to do so. In purchasing such a large stock of coal they had been amply justified, because the price had gone up very much, so that the company had saved a very large sum. As to the application to Parliament, he had always looked upon it as worthless, for so long as they could produce a balance-sheet showing a profit such as they had made during the past year, they should never get any relief from Parliament, nor did they require it. He expressed his belief that next year, notwithstanding the price of coals, they should be able to clear a dividend of 7 and 8 per cent. as heretofore. He did not think they need have taken any trouble to get any help from Parliament. He must say they were liable to pay the Gas and Water Association a half per cent. upon their rental, but only in the event of the expenses necessitating such a sum.

Mr. ROWAN did not think he was unreasonable in asking that the dividend might be increased to 7 per cent., as their past year's working would really admit of their paying 10 per cent.

Mr. CATCHPOOL remarked that the directors had recently reduced the expense of purifying the gas from £4 to £1 a week. He believed they never had better gas in the town than at the present time.

The CHAIRMAN again pointed out that there was no intention of applying to Government for relief unless it should hereafter become necessary—they all hoped and trusted it would never be necessary; and it could only be done by a resolution of the shareholders.

The proposition of Mr. Rowan not being seconded, it fell to the ground, and the motion for the adoption of the report was then put and carried, the dividend as therein recommended being declared.

The retiring directors and auditor were re-elected, and thanks were voted to the chairman, directors, auditors, and managers, which having been suitably acknowledged, the proceedings terminated.

DUBLIN ALLIANCE AND CONSUMERS GAS COMPANY.

A Meeting of the Shareholders of this Company was held on Monday, July 7, for the purpose of receiving a report prepared by the committee appointed at a previous meeting, and of considering what further steps should be taken in reference to the refusal of the directors of the company to convene a special general meeting, as requested by the shareholders. The chair was occupied by Mr. EDWARD MACREADY.

The CHAIRMAN, in opening the proceedings, said it was on the 7th of May that the shareholders had met there before, and on that occasion they appointed a committee of shareholders to look after their interests. The committee had called the present meeting to report to the shareholders what they had done in the affairs of the company. At first they thought they were looking after the interests of the shareholders present, but they afterwards learned that other interests were at stake, and that a large number of shareholders were out of Ireland—in England and Scotland. In order to let those shareholders know how they stood, one of the members of the committee (Mr. Drimmie) undertook to compile statistics, and those statistics were based on evidence given before the House of Commons, and the company's own accounts. After having compiled that report the committee next looked to the Act of Parliament under which the company was established, and they found that the shareholders, when they wished to call a meeting, must comply with a certain section of the Act, which provided that one-tenth of the capital should be represented amongst the shareholders signing the requisition, upon which the directors must there and then convene a meeting. They had done this, and after some time they got an answer from the directors saying that, after a consultation with their legal adviser, they could not comply with the request of the shareholders; but they also stated that they would have no objection to a friendly chat with five members of the committee. As the directors had gone to their legal adviser, the committee also had obtained legal advice. Mr. Drimmie would read for the meeting counsel's opinion.

Mr. DRIMMIE read the case submitted to counsel and the opinion. He then stated that as the directors, shielding themselves behind a mere technical objection, refused to convene the meeting, because it sought to remove them from office, the committee, under the advice of counsel, had determined to lodge another requisition in a somewhat altered form. He then moved—"That, inasmuch as the directors of the Alliance and Dublin Consumers Gas Company have taken advantage of a technical objection to refuse to convene an extraordinary meeting of the shareholders, in accordance with the requisition lodged with them on the 3rd of June, 1873, the shareholders shall now sign the following requisition, which we are advised by counsel is strictly formal and legal, and one on which the directors will most unquestionably be bound to call the meeting, and that same be lodged with the directors immediately."

The Alliance and Dublin Consumers Gas Company.

We, the undersigned persons, amounting in number to more than 20, respectively holding the number of shares in the Alliance and Dublin Consumers Gas Company set opposite our names, and holding in the aggregate not less than one-tenth of the capital of the said company, hereby require the directors of the said company to call an extraordinary meeting of the said company, for the following objects, viz.:—To declare that, in consequence of the unsatisfactory position of the affairs of the company for some time past, as proved by the evidence recently given before a committee of the House of Commons, the present board of directors does not possess the confidence of the shareholders of the company, and if all or any of the said board should resign their office, to take or recommend proceedings for the election or nomination of their successors, pursuant to the statute. To resolve that no directors henceforward to be elected, nominated, or appointed, shall receive any remuneration unless and until the shareholders receive a dividend of not less than 6 per cent. per annum out of profits actually realized by the company within the year for which such dividend shall be declared. To

resolve that the salary at present paid to the secretary, amounting to £1000 per annum, shall, so soon as such reduction can be legally made, be reduced to such amount as the extraordinary meeting shall deem just and expedient. To resolve that all contracts for coal and other supplies required by the company, after the determination of existing contracts, shall be publicly advertised for, with directions that the tenders for such contracts shall be sent in sealed covers, which shall be opened at a board meeting only, and that such tenders shall be accepted or rejected by the directors, but only when assembled as a board. To consider and decide on the steps to be taken in order to remedy the defects in the carbonizing and distributing departments of the company's works, and to prevent the losses thence arising to the company. To appoint a committee of shareholders to investigate the affairs of the company generally, with instructions to the said committee to report the result of their investigations at an adjournment of the extraordinary meeting to be fixed thereat.

Mr. DRIMMIE continued: With regard to the objects of this requisition, I think you will agree with me that they are necessary, in order to place our property in the prosperous position which it should occupy; but, for the information of the meeting, it may be well for me to refer to them in detail. With respect to the vote of want of confidence in the directors, I remark that the adoption of this course is exceedingly disagreeable, and only resorted to because it is necessary in the interests of the company. The former requisition proposed to remove them, but as they took advantage of that proposition as being informal, we must now resort to another mode of carrying out our object. The gentlemen who comprise the board of directors are known to us all, to some of us, perhaps, intimately, and most, if not all of them, have long held prominent positions in the commercial community of our city, but their management of our concern has been most disastrous for the shareholders and the gas consumers of Dublin, and I am therefore pressed by a sense of duty to myself and fellow-shareholders to support the object of the requisition. Any one reading the undeniable facts set out in the report of the committee to the shareholders, on the sworn testimony given in the House of Commons, must be startled to find the state into which our concern has been allowed to drift—we allude to the excessive expenditure of our capital without adequate return, and the great defects in our works and in the distributing apparatus, which the directors reports from time to time led us to believe were most satisfactory. I need not go further into the matter than to say that the engineers examined before the parliamentary committee condemned the works as being in the most unsatisfactory state, and that it appears beyond question that no less than nearly one-third of all the gas manufactured last year was lost by leakage or unaccounted for. Under such circumstances it will be manifest to every shareholder that a change must be immediately effected in the management, in order to place the company in the prosperous position it is entitled to occupy, and, therefore, they are called upon to support this vote of want of confidence, which is practically calling upon the directors to relinquish their seats and place them at the disposal of the shareholders. Doubtless some of you will be of opinion that it is not necessary to dispense with all our present directors, but you will have seen from the opinion of counsel, which I have already read for you, that to attain our object properly we must first remove all, and then the shareholders can elect a new board, re-electing any of the present directors they desire. In regard to the next point in our requisition—that is, the question of the remuneration to the directors for the future—it is proposed that they shall not receive any fees till the shareholders receive a dividend of not less than 6 per cent. This is only reasonable, as it cannot be doubted that under even fairly good management the dividend to shareholders should not be less than 10 per cent. per annum. The next point is as regards the salary paid to the secretary. Your committee considered it to be in excess, but this is a matter to be dealt with by the shareholders at the proper time. In regard to the next point, the committee consider that, as a matter of business, all contracts of whatever kind entered into by the company should be publicly advertised for, and I think this will commend itself to every shareholder as a measure both prudent and desirable in the interest of the company. The next point is one of the utmost importance to the shareholders—that is, to effectually remedy the defects in our works. The loss sustained in consequence of these defects has been disastrous. Only think that through these defects last year alone there was a loss of nearly 200 million cubic feet of gas, or, in other words, a waste of nearly 22,000 tons of coal. I need not further refer to the loss sustained by the shareholders in these departments, or the necessity for having the defects remedied. Judging from the directors reports, doubtless many, if not all of you, concluded that your works were in a state of perfect efficiency, and that the decrease in profits was attributable to exceptional temporary causes; but such does not appear to have been the case at all, and the enormous loss which has been entailed on you has resulted from defects in the works and experiments with new and untried inventions instituted by the management. This is no mere assertion of mine, but has been sworn to by eminent gas engineers of unquestionable ability and high character, who had carefully examined the works, and closely investigated the position of the company generally. And here I may draw attention to the circular issued by the directors to the shareholders on the 15th of May last, stating that they had invited Mr. Hawksley and another gas engineer to visit and report on the works. Almost two months have since elapsed, and if I am correctly informed, no such inspection or investigation has yet been commenced. It is therefore obvious that the shareholders must immediately take this matter in hand themselves, and obtain advice and assistance from gas engineers competent to deal with it effectually, and to place our works in a state of efficiency. As regards the last clause in the requisition, its object is solely to give the shareholders an opportunity of knowing exactly how the business and affairs of the company have been conducted and managed since 1866, the date of the amalgamation, and of suggesting any changes or improvements for the future management which they may consider desirable. The enormous outlay of capital since the amalgamation in 1866 appears to have been expended more in embellishing the works than in effecting substantial and necessary improvements. In the balance-sheet issued in Sept., 1867, it is shown that £462,839 19s. 7d. had been expended on the works, and since then no less a sum then £191,259 17s. 6d., which in itself would have gone a great way towards the erection of new substantial works in the city of Dublin, if such were necessary, has been added to the expenditure; but though the general tenor of the reports issued by the directors assured the shareholders that the works were in a thorough state of efficiency; and, indeed, some people reading these reports would fancy they were the most perfect in the kingdom—yet we now find to our dismay that they are in an unpardonable state of inefficiency, and that the great outlay of capital for the last six years has, comparatively speaking, gone for little or nothing. It will, no doubt, surprise you to know that in this period the company actually expended more capital than the entire amount of profit realized, the gross profits being only £174,910 11s. 6d., or £16,349 6s. less than the £191,259 17s. 6d. capital expended. I think you will agree with me that this continuous excess of expenditure over profits realized is the very worst management, and more especially so when at the end of seven years, after such enormous expenditure, our rate of dividend from profits realized has decreased from 8¾ to £4 2s 10d. per cent. per annum. And this is more unsatisfactory when we consider that while our income for the year ending the 31st of December, 1867, was £146,560 6s. 8d., our income for the year ending the 31st of December, 1872, had increased to £192,881 14s. 4d. I need not remind you that gas companies having the largest incomes have the greatest scope for profits; but the contrary appears to have been the experience of this company, and unless a radical change be effected in the management there appears to be no room for hope that we shall ever reach the state of prosperity which the company should enjoy. I had intended to quote from the various reports issued by the directors since 1867, to show the unreserved statements they put forward from time to time in regard to the satisfactory state of the works both in respect of the production of gas, economy in working, and reduction of leakage, and their assurance that all the works were in thorough repair and in good working order; but at present I shall not trespass on your time with this subject, although I may bring it fully before you in another form hereafter. The only purpose just now is to show that the resolution I have moved is deserving of your unanimous support, and its adoption necessary for the promotion of your own interests. I might easily have shown very much stronger grounds for it than I have put forward, but in the discharging to me of a very disagreeable duty, I am most anxious to avoid as much as possible touching on points which might perhaps wound the feelings of others, and I therefore leave the resolution in your hands without further observation, having, as I think, shown ample grounds for its adoption.

Mr. CREE said before the motion was seconded he wished to say that they had but one common object, and that was the good of the company. He believed the committee who had summoned them there had manifested great zeal, and were deserving of the thanks of the shareholders. The friends who had been acting with him in considering what was best to be done in the interests of the company thought so, and coincided in everything except as to the way in which their object was to be carried out. He thought that a more prudent and correct course of action might be adopted than that proposed in the resolution. The pamphlet contained a mere *ex parte* statement. The terms of the circular which they had issued to the shareholders they were all familiar with. It called for an investigation of the affairs of the company. The shareholders by whom it was issued were about 300 in number, and he was bound to say that the capital represented by those shareholders did not fall short of £150,000. The utmost they had done was to make a strong statement against the directors, and it would be open to them to explain or deny it. If they did not explain, they could call on them to resign, and let them (the shareholders) appoint others in their places. He took exception to the words contained in the resolution, that allegations against the directors had been "proved" in evidence before the committee of the House of Commons. The directors were not present to defend themselves, and it appeared to him that those words might be changed without affecting the proposition. The requisition now to be presented to the directors should have the sanction of the whole company, and if, after a general meeting, it was found that the directors were unable to answer or explain the charges alleged against them, they would be in a position to ask them to resign.

The CHAIRMAN said if the directors had anything to say in their own defence, they had had ample time to say it. It was very well for Mr. Cree to come forward to defend the directors; he had always done so. But the shareholders had now acted in accordance with the Act of Parliament, and if the directors were to be removed, they had taken the proper course to effect that. There were men on the board who were directors in half a dozen companies, and they could not give their undivided attention to this one; and, in appointing new directors, he thought it would be judicious to say to each one, "You are not to be a director of any other company."

Mr. LINDSAY: One of the directors is in thirteen companies. He told me so himself.

The CHAIRMAN: A very good authority.

Mr. JOHNSTONE suggested that the word "stated" should be inserted instead of "proved."

The CHAIRMAN: Say "stated on oath."

Mr. DRIMMIE: You must allow that the committee of Commons declared it to be proved.

After some conversation, the meeting decided that the words should remain as they stood in the resolution.

A vote of confidence in the committee, moved by Mr. BEHAN, and seconded by Mr. LINDEN, was unanimously passed, after which a subscription list was opened to defray the expenses of the committee.

The requisition was then signed by the shareholders present, and a vote of thanks having been passed to the chairman, the meeting separated.

A meeting of the committee was held on the 11th inst., at which it was stated that the memorial had received a large number of signatures, and it was resolved that its presentation should be delayed until this day.

BRITISH ASSOCIATION OF GAS MANAGERS.

(*Continued from page* 597.)

WEDNESDAY, JUNE 11.

The PRESIDENT took the chair at eleven o'clock this morning, and the reading of papers was resumed.

Mr. T. H. METHVEN (Bury St. Edmund's) read the following paper:—

ON COALS WASTED IN GAS-WORKS.

With coals at 21s. instead of 6s. free on board in the Tyne, it becomes every one concerned in the manufacture or consumption of gas to give the coal question his careful consideration.

In a paper recently read by Sir William Armstrong, he stated that he considered the high price of coals was chiefly caused by a slight excess of demand above the supply, and that as there was no hope of an increased output, the only possibility of lower prices was in a diminished demand. He gave the result of his own action in the matter, which was caused by the high price of coals and the above views. Instead of continuing the use of several engines and boilers of ordinary construction, he erected a Corliss engine and improved boiler, and reduced the consumption of coals from 50 tons to 24 tons per week.

It is just possible the justly eminent man would have cared nothing for the Corliss engine, which has been manufactured for years, and may be seen in use on the opposite side of the Forth at Kirkcaldy, had coals continued at the old prices.

As manufacturers are compelled to economize fuel, surely in gas-works, in which coal is so important an item, the utmost economy should be used. I therefore, through this association, would direct the attention of gas directors in towns of 6000 inhabitants and under to the subject. To them it is an important one. In many cases, unless they do so, there will be no dividend, in others a reduction, or rather the prevention of an additional charge of 1s. or 1s. 6d. to the consumers may be effected. In such towns, with coals at 15s. per ton, and gas at 5s. 6d. per 1000 feet, there was no difficulty in paying the usual dividend of 5 or 6 per cent. The management of such gas-works is usually in the hands of directors who attend to the receipts and payments of a secretary, who is often a rate collector, banker's clerk, or small tradesman, who makes out and collects the accounts, and of a working manager who keeps up the supply of gas and attends to consumers complaints.

By this system you have a subdivision of labour and also of responsibility. There is certainly a head. The directors, who know nothing of the practical part of gas-making, whilst the only man who knows, or is likely to know anything of the matter, has no power or responsibility, except to keep the gas-holder always afloat. Usually no one connected with the undertaking has any thorough knowledge of the subject, nor understands the proper system of management necessary in larger works, and not less so in small ones. No one is responsible for, or perhaps knows of, the waste. Need we, therefore, wonder that the amount of gas paid for that is obtained from every ton of coals carbonized is from 5000 to 6000 feet per ton?

In some well-conducted works of the size under consideration, the sales per ton of coals carbonized range from 7000 to 8000 feet, whilst in those of

the metropolis they range from 8000 to 9000 feet. Certainly there is room for improvement upon the 5500 feet, which a considerable experience leads me to state as a fair average upon which we may calculate as usually obtained in the towns referred to. If I am correct, the following balance-sheet will be allowed for a town of 5000 inhabitants, taking the consumption at 800 feet per head and coals at former prices:—

Balance-Sheet No. 1.

Receipts.—4,020,000 feet of gas at 5s. 6d.		£1105	0 0
375 chaldrons of coke at 12s. per chaldron (18 bushels per ton)		222	0 0
7500 gallons of tar at £5		37	10 0
		£1364	10 0
Expenditure.—750 tons of coals at 15s., producing 5500 feet at consumer's meter	£562 10 0		
Wages and salaries	260 0 0		
General expenses	220 0 0		
		1042	10 0
Balance profit		£322	0 0

This would allow of a dividend being paid at the rate of 6 per cent. on £5000, which will not be considered an unreasonable capital. I have been liberal in my allowance for coke sold. Seldom are 18 bushels per ton set aside for sale. It has been almost unsaleable on account of the large quantity in the market. Had only the proper quantity of coals been carbonized in the gas-works, a readier sale and higher price would have been obtained for it. Under proper management, you will readily allow

Balance-Sheet No. 2.

Receipts.—4,020,000 feet of gas, as before, at 5s. 6d.		£1105	0 0
325 chaldrons of coke at 12s. per chaldron (20 bushels per ton)		195	0 0
5360 gallons of tar at £5		26	16 6
Ammoniacal liquor, same value as tar		26	16 6
		£1353	13 0
Payments.—535 tons of coals at 15s., required to produce the above gas at 7500 feet per ton at consumer's meter	£402 0 0		
Wages and expenses, as before	480 0 0		
		882	0 0
Balance profit		£471	13 0

This would allow of a dividend of 9½ per cent., or, should the directors have an objection to take more than 6 per cent., they might reduce the cost of gas 10d. per 1000 feet.

The high price of coal has done away with all such balance-sheets as No. 2, so that now we can have, with the management as in No. 1 and the present price of coals,

Balance-Sheet No. 3.

Receipts.—4,020,000 feet of gas, as before, at 5s. 6d.		£1105	0 0
375 chaldrons of coke at 24s. per chaldron (18 bushels per ton)		444	0 0
7500 gallons of tar at £5		37	10 0
		£1586	10 0
Payments.—750 tons of coals at 30s. per ton, producing 5500 feet at the consumer's meter	£1125 0 0		
Wages and salaries, as in No. 1.	480 0 0		
10 per cent. increase	48 0 0		
		1653	0 0
Balance loss		66	10 0
An addition of 1s. 10d. per 1000 feet		367	10 0
Sufficient to pay 6 per cent.		301	0 0

With good management, as in No. 2, and with coals at 30s. per ton, we will have

Balance-Sheet No. 4.

Receipts.—4,020,000 feet of gas, as before, at 5s. 6d.		£1105	0 0
325 chaldrons of coke at 24s. per chaldron (20 bushels per ton)		390	0 0
Tar and liquor, as in No. 2		53	13 0
		£1548	13 0
Payments.—536 tons of coal at 30s., producing 7500 feet per ton at consumer's meter	£804 0 0		
Wages, as before	480 0 0		
10 per cent. increase	48 0 0		
		1332	0 0
Balance profit		£216	13 0
An addition of 6d. per 1000 feet would leave enough for 6 per cent. dividend		100	10 0
		£317	3 0

In order to maintain a fair comparison, I have supposed the consumption of gas stationary; but if the district in which the works are situated is an increasing one, and could all the coal now wasted in balance-sheet No. 3 be made into gas and sold, the receipts would be increased £412 10s., and there would remain a net profit of £346, which would pay more than a dividend of 6 per cent.

In England and Wales there are about 350 towns with a population under 6000. These in the aggregate consume annually, on the basis of the moderate estimate on which my argument is founded, 144,000 tons. If only 5500 feet of gas instead of 7500 feet are sold, it follows that 44,000 tons of coals, worth (after deducting the products) £44,000, are wasted. This is equal to £125 per gas-work per annum—a sum in many cases exceeding the dividend paid. My estimate of the consumption of gas is only suitable for agricultural towns, which often use less than half of that used in manufacturing towns. The waste may therefore be nearer to 88,000 than 44,000 tons. Certainly this might be prevented. Should any one doubt my statements, let him analyze the next balance-sheet he may receive.

The cause of this waste is the want of skilful superintendence, for no director, however clear in his own profession or trade, can have the ability which is needed to produce gas at the lowest cost. It is only by years of patient attention that this can be obtained.

Now as to the causes of the mismanagement, these are as follows:—

1. Badly set and worked retorts.
2. Clay retorts, with insufficient attention.
3. The want of a station-meter, or neglect to use it.
4. Neglect to weigh or measure the coals.
5. The want of or neglect to use a governor.
6. Badly laid mains or service-pipes.
7. Unsuitable burners and arrangements for the public lamps.

If gas directors wish to be paid for 7500 feet per ton, they must attend to the whole of these matters, or obtain some one who can do so. If not, their gas-works must remain as badly managed as they now are, and they must go without a dividend if prevented by any local act from raising the price of gas. If, however, they are not hampered, and wish their usual dividend, unless they improve their management gas consumers will have to pay an extra 1s. per 1000 feet for their gas, to cover the waste, of which the majority of gas directors are quite ignorant, and which might with ease be prevented.

There was no discussion on this paper, but a vote of thanks was given to the writer.

Mr. F. W. Hartley (London) read the following paper:—

ON COAL GAS AS A FUEL.

The employment of coal gas, and of other inflammable gases, in the place of solid fuel, has been advocated by inventors and others; but, as far as the author's knowledge extends, no attempt has been made heretofore to show, by reference to known facts, and by calculations based thereon, the relative commercial value of coal gas and of solid fuel for heating purposes, and it occurred to him that a short suggestive paper might lead to a discussion embracing practically valuable information. He has not attempted to treat the subject exhaustively, for to do this would necessitate a paper of much greater length than he could spare time to write, or the members would possibly care to listen to the reading of, but merely essayed to put forward certain salient facts and the conclusions in relation to them. Some of the facts and conclusions are antagonistic to the use of coal gas as a fuel; but although this is the case, and it may appear singular to argue against the use of coal gas before such an association as this, the author feels quite satisfied that it will be understood that his only motive is to establish a sound basis on which to erect the superstructure of application.

The object of the paper is, then, to show, in respect to certain applications, the relative value of coal and of coal gas as heat-developing agents; for coke need not be considered at all, inasmuch as experience shows that good coke generally evolves on combustion as much heat for equal weight as the coal from which it is produced.

It is desirable first to deal with coal, and the value of coal for heating purposes is usually expressed by a statement of the number of pounds of water which 1 lb. of coal is capable of converting into steam from the boiling point, or of raising 1° Fahr. in temperature. The heating power of coals differs very widely, the evaporative power of those of Great Britain varying in practice from about 6 lbs. to as high as 10 lbs. water converted into steam for the boiling point, or from 5802 lbs. to 9670 lbs. water raised through 1° Fahr. There is, besides, a very wide difference between the theoretic value calculated from composition and the actually attainable heating value of coals, and this difference is shown very strikingly in the tables contained in the report published some years since of Sir H. De la Beche and Dr. Lyon Playfair. A few examples of this difference will suffice. The actual evaporative value of anthracite is shown to be 9·46 lbs. water boiled off, of Llangennech 8·46 lbs., and of Wallsend (Elgin) 8·46 lbs., of which the theoretic values are respectively 14·593 lbs., 14·26 lbs., and 13·422 lbs. Of course, in practical application, much depends on the form and construction of the boiler, its size, and the arrangement of the furnace and the flues. It is certain, however—and an investigation of recorded facts will prove this—that with a thoroughly good furnace coal the evaporative value does not rise higher than 9 lbs. water to the pound of coal, although it is perfectly true that with water tube boilers the evaporative power rises sometimes to 10 lbs., or even somewhat higher. If, then, the evaporative power of coal be taken at the usual average of 9 lbs., it will be high enough for the purpose of comparison. If 9 be multiplied by 967 (the number representing the latent heat of steam at 212° Fahr.), the product is 8703, which equals the number of pounds of water which 1 lb. of coal will raise through 1° of Fahrenheit's thermometer.

It is now needful to consider what has been the practical results with coal gas, and the best illustration which can be taken is the statement contained in the paper read by Mr. Goddard to this association in June, 1870. That gentleman brought under the notice of the meeting an admirably constructed boiler with a gas furnace, and stated that 27 gallons, or 270 lbs. of water were raised through 145° Fahr. by the combustion of 60 cubic feet of coal gas. This result is equal to raising 39,150 lbs. water through 1°, and shows that 13·2 cubic feet (nearly) of gas gave the same amount of heat as 1 lb. of coal. It is but fair to remark that this result shows also that the gas employed, which I assume to have been common coal gas, must have been of a tolerably high illuminating power. If, then, the gas be taken at 4s. per 1000 cubic feet and coals at 25s. per ton (a price quite low enough now for localities at a distance from the pits), then 4s. worth of gas would be required to produce the same amount of work as eleven pennyworth of coal nearly.

In some of the large water-works, and with engines worked on the expansive system, less than 3 lbs. of coal suffice per horse power per hour, and it is claimed for some engines of 50 to 100 horse power, that about 2 lbs. of coal, or less, suffice per horse power per hour; but in smaller stationary engines there can be no doubt that the consumption ranges from 7 lbs. to as high as 14 or 15 lbs. of coal per horse power per hour, and as gas is really available only for small engines, these weights must be taken as the basis for comparison.

Mr. Goddard stated that with the Jackson boiler 100 cubic feet of gas were required per horse power per hour; it thus follows that the cost per hour would be for gas 4·8d., as against 0·94d. for 7 lbs. of coal, or as against a fraction over 2d. for 15 lbs. of coal; so that in the face of these figures gas is manifestly a very expensive fuel, and it is quite evident that whenever engines are required for continuous work there can be no question as to which kind of fuel is to be preferred on economical grounds. Mr. Goddard was quite clear upon this point, for he spoke of Mr. Jackson's invention as useful when power is needed intermittently; but he said this in favour of the gas, "that a very small modicum of gas is required to maintain the pressure of the steam when the engine is at rest." A large allowance, therefore, must be made, in instituting a comparison of cost of fuel, when an engine has to be used intermittently, and it is quite possible that when the intervals of action are wide apart, and the duration of action short, that gas would be the most advantageous fuel for engines not exceeding 2 or 3 horse power, the more especially as with gas there is no stoking and clinkering to be done, no wear and tear of furnace and fire-bars, and in fact so little attention needed that the engineman would be able to attend to a much greater extent to other work, thus reducing to a mere trifle the cost of attention to the engine. In respect to gas used explosively in the gas engine, it would seem, if published statements may be relied upon, to be more economical than when used to raise steam for an engine; this is quite reasonable, and therefore to be expected, the relative cost being 4·8d. per horse power per hour for steam raising, as against about 3d. when used explosively. All these facts and reasonings tend conclusively to prove that gas can never on the large scale compete with solid fuel, whether the application be for heating water, to supply steam to engines, to warm buildings, hot-houses, &c., &c., for even if coal gas were manufactured for the purpose, at one-third the price herein assumed, so large a margin would be left in favour of solid fuel as to put gas out of competition. Very similar relations hold in respect to the two kinds of fuel when used for cooking on the large scale, and when the viands are for the greater part boiled or steamed. A few pounds of coal will do a wonderful amount of work in a well-constructed kitchener. It is asserted very positively in respect to one celebrated kitchener or cooker which has come under the author's notice, with which most of the viands are steamed, that the expenditure of fuel in cooking dinners for 150 people is only 49 lbs.

of coal. This quantity at 30s. per ton would cost very nearly 8d., while the same heat generated from the consumption of gas would cost, at 4s. per 1000 cubic feet, something like 3½ times the money. In this illustration, however, the solid fuel is used under the most favourable conditions—mainly to vaporize water into steam—and the whole operation is carried out in the most careful and systematic manner. The relations between gas and coal are very different where what may be called dry cooking—baking or roasting—is concerned. For this purpose, on a moderate scale, gas is by far the most advantageous, because it can be put into full operation the instant it is wanted, and its combustion stopped the instant that the necessity for its employment ceases. There are in addition certain other important advantages with gas, apart from mere cost, which it is not the purpose of this paper to treat of. One fact is brought out very strongly in the foregoing statement relative to the cooker—namely, the great amount of work to be done at little cost with steam. This fact is to a large extent lost sight of in the application of gas. It is thought, as a rule, sufficient to provide so many burners, and as many pots in which actually to boil the food in water. During this boiling a large proportion of the water is driven off as steam, and its heat wasted, the value of which must be at once apparent when it is remembered that one pound of water (27·28 cubic inches) evaporated becomes nearly 27 cubic feet of steam, and contains heat enough to raise 5½ lbs. of water from 32° to 212°.

Two important purposes for which gas can be used with economy are brazing and soldering. In relation to brazing, the author is, however, unable to furnish statistics; but as regards soldering, the solid fuel being charcoal at 2s. per sack, gas has been proved, from the author's own experience, to be from 20 to 30 per cent. cheaper.

The next comparison which might with advantage be instituted between gaseous and solid fuel is in respect to relative value for warming rooms, the solid fuel being burned in an open fireplace, and the gas in the best form of gas-stove. There are, however, two difficulties in the way—first, in ascertaining what is the average proportion of the heat power of the solid fuel which is really effective, and this must depend on the form of the grate and on the area of the chimney, which is generally much larger than is needful for the purposes of combustion. It has, however, been variously estimated that in an open fire only as much as from one-eighth to one-third of the heating power of the fuel is utilized, the rest escaping up the chimney.

The next difficulty is in relation to the stove in which the gas is to be burned. Gas-stoves are of all imaginable constructions, like gas-burners are, and certainly there seems fully as much scope for improvement in gas-stoves as there was for improvement in the Argand burner, when Mr. Sugg devoted himself to its study. There are the simple cylindric, double cylindric, cone and cylinder, multi-cylindric or tubular, and bee-hive stoves, of wrought iron, cast iron, or porcelain; some being ventilated, and serving only to warm by radiation and by convection from the air coming into contact with the heated body of the stove, and others non-ventilated, which not only warm by radiation and convection, but also by the discharge of the hot gases of combustion into the apartments. The latter kind of stove, whatever be its merits in other respects, is most objectionable, and should, in the author's opinion, never be employed. It has been urged in their favour that there can be no more harm in burning gas in a stove than in a gas-burner. This argument is utterly illogical. In the one case gas is burned for the production of *light* and in the other for the production of *heat*. If, therefore, rooms in which gas is being burned for lighting become oppressive, the simple opening of a door or window for a minute or two serves to freshen the atmosphere, while the usefulness of the gas is still preserved. Not so in heating; in this case the admission of fresh air to a large extent nullifies the very object for which the gas is employed, and the room is cooled to an undue extent until again it becomes oppressive, and the same wasteful process has to be repeated.

It is not possible, however, to show, by calculation, any striking amount of deterioration in the atmosphere of a tolerably close room warmed by the combustion of a moderate quantity of gas, but sensations may be referred to. Now every one here must be sensible of the oppressiveness of close rooms when warmed by the combustion of gas in such stoves as have been just objected to. It is quite true that all close rooms warmed by the contact of the air with highly heated surfaces are apt to feel oppressive, from causes which are tolerably well known; but certainly it cannot be wise to add another evil, which is done when carbonic acid and sulphurous acid gas—it may be in small but nevertheless irritating quantities are delivered into the air from the burning fuel. Lately a very attractive form of stove has been brought out—namely, the "Reflector," or "Cheerful" stove, but the author believes that the most economic application, and certainly the most satisfactory to our predilections, is the heating up of solid material in an open grate, not, however, in an ordinary grate, as is the usual plan, but in one forming part of a cubical or cylindrical stove, the upper portion, and possibly other parts of such stove being multi-chambered, these being so divided that one set should serve to carry off the products of combustion, and the others for air to circulate through and be effectively warmed. In some such construction as this there would be the cheerfulness of an open fire, the maximum of heat would be utilized—the author believes as much as 8-10ths or 9-10ths of the whole heat generated—the products would be carried off, and with them sufficient of the air of the apartment to keep the atmosphere in a healthful condition. Of course the author is quite sensible of the difficulty of carrying out such a construction with very small gas-stoves, and also the many cases which arise in which stoves are wanted for use in rooms where anything more than what may be called general or accidental ventilation is not possible, owing to the profound indifference which builders manifest too frequently in respect to provisions for systematic ventilation. But to institute any comparison, data must be established, and, upon the grounds given, it will be assumed that 8-10ths of the heat of the gas may be utilized, and one-fourth of that from coal burned in a chimney grate. It has been shown that under a boiler 1 lb. of coal and 13·2 cubic feet of gas produce the same amount of heating effect. Under the conditions now assumed, 4 lbs. of coal and 16·5 cubic feet of gas would be equal in heating effect. Now these quantities cost—coals being 30s. per ton and gas 4s. per 1000 cubic feet—coal 0·6428d., and gas 0·7920d; showing the latter to be really advantageous when all things are taken into account, such as the absence of dust and dirt, the rapidity with which the fire can be made, and the equal rapidity with which the expenditure can be put an end to when heat is no longer wanted. True this conclusion is arrived at speculatively, but really it grows out of extended observation, although not supported by absolute and specific experiments.

The author intended, however, to enter into a series of experiments for the purposes of this paper, and also to collect information as to the economic value of gas for heating small hothouses, conservatories, artificial incubation, &c.; but, unfortunately for himself, or for his credit, pressure of business first, and next his own indifferent health during some time, led to delay, and finally he has been compelled, in fulfilment of his promise, to write this little paper under the pressure of a series of personal troubles of a very distressing kind, which have at times so affected his nervous system as to render mental exercise impossible. He has, therefore, been obliged to produce such a paper as was possible to him under the circumstances, and most sincerely trusts that its deficiencies will be fully compensated for by facts brought out in the discussion.

The PRESIDENT said this was a subject which deeply affected gas companies, and it had been most ably brought before the association by the writer of the paper. Anything that would promote the consumption of gas during the hours of the day must be of the greatest consequence to their interests, and he hoped that much good would follow the discussion of the question.

Mr. SUGG (London) desired to offer a few remarks at the outset, and said that had he known the line which Mr. Hartley would have taken in his paper he should have been prepared with a few facts which, while perhaps disproving one part of his observations, would have supported the rest. With respect to the use of gas for heating of rooms by the boiling of water, there was one very important thing to be attended to, and that was to prevent the heat communicated to the boiler from escaping at the outside surface. This might be done by felting the boiler round, or enclosing it in a box and simply allowing the products of combustion to escape through a number of small holes in the box. The heating power of the gas would thus be very greatly increased, whereas if an open boiler were made use of the heat would be rapidly lost, and there would be a great waste in consequence. He had demonstrated the importance of this precaution in his own establishment, where he had a large shop 30 feet by 18, and 15 feet high, thoroughly well heated by the consumption of 10 feet of gas per hour. The boiler was enclosed in a box, and the products of combustion escaped from the sides of the box, which were perforated with holes. In reference to the heating of rooms by gas—dry heating—there was no doubt that if the system proposed by Mr. Hartley was adopted the best possible results would be secured—*i. e.*, by externally heating the air by means of gas, and conveying the fresh warm air into the apartments, instead of allowing the products of combustion to escape into the room. With regard to the ventilation of rooms where gas was used, there was a very simple mode of accomplishing it—viz., ventilation by diffusion. Dr. Macadam, in his lecture on the previous evening, had spoken of the power of diffusion possessed by gases. That power might be effectively utilized to secure the ventilation of rooms. By means of a diaphragm of muslin placed over a window or opening, this diffusion could be carried on. The porosity of the muslin would allow the heated air to escape more rapidly than the cold air could enter the apartment, and thus ventilation would be obtained without draught.

Mr. PATERSON (Warrington) said he could not sufficiently express the satisfaction he had felt with the reading of Mr. Hartley's admirable paper on a subject which had not yet received that attention from engineers its importance deserved. At an early date Mr. W. H. Palmer, of the Western Gas Company, found that a cubic foot of gas (the specific gravity of which was not stated) raised 20,000 cubic feet of air 1°. Taking this result as datum, it would be found that air was to water as 1 to 3·7, and as 12 cubic feet of air was equal to 1 lb., then $20{,}000 \div 12 = 1666{\cdot}6$, which being divided by 3·7, gave 450 units by the combustion of 1 cubic foot of gas. Mr. F. J. Evans obtained from 1 cubic foot, having a specific gravity of 0·410, 650 units. Mr. Goddard, in his researches on the same subject, found that 27 gallons or 270 lbs. of water were raised through 145° by the combustion of 60 cubic feet, presumably about the same specific gravity, as it worked out to 652 units by the combustion of 1 cubic foot. The names of those gentlemen were a sufficient guarantee for the accuracy of any experiment which came from their hands; but the practical results were somewhat higher than those which he (Mr. Paterson) found on the ordinary application of the Bunsen burner to heating purposes. The details of those experiments were published in a scientific paper at that time, and it might prove interesting to tabulate the results:—

Abstract of Experiments on the Calorific Value of Gases under different Specific Gravities.

	Specific Gravity of Gas.	Cubic Feet = to 1 lb.	Units of Heat from 1 Cubic Foot by Calculation.	Units of Heat from 1 Cubic Foot by Experiment.	Decimal Proportion Calculated, Value as 1.	Water Evaporated in lbs. by 1 Cubic Foot.	Water Evaporated in lbs. by 1 lb. of Gas.	Decimal Equivalent of 1 lb. to 1-Horse Power = 33,000 as 1.
Boghead cannel. .	0·685	19·1	1213	558	0·485	0·595	11·27	0·323
Mixture of Boghead and Arniston. .	0·658	19·65	1224	588	0·480	0·595	11·81	0·354
Shale (Berwick)—sp. gr., 1·733 . .	0·650	20·33	1188	524	0·441	0·530	10·78	0·323
Mixed cannels . .	0·595	21·15	1114	544	0·488	0·550	11·64	0·349
„ gases . . .	0·440	30·14	886	472	0·533	0·478	14·40	0·431
„ „ . . .	0·246	63·87	497	312	0·628	0·316	20·17	0·600
Hydrogen	0·0693	189·0	328	284	0·866	0·288	54·33	1·626
Anthracite, S. Wales Averages—	Best application, as used in steam-boilers.						10·70	0·329
40 varieties, American coals							8·16	0·241
12 do., Lancash. do.							7·88	0·236
7 do., Newcstle. do.							7·86	0·235
7 do., Scotch do. .							6·66	0·199

These showed that the average evaporating powers of gas and water were as 1 to 2½. Mr. Goddard made it 1 to 3 nearly. Taking, however, the best practical results as adopted by Mr. Hartley, the heat lost by radiation and otherwise was so great that improvements were much needed in that direction, and in the practical hands of Mr. Hartley there was no reasen to doubt the application of gas to calorific purposes would not remain in its present unsatisfactory state.

Mr. WATSON (Sydenham) said Mr. Hartley's paper pointed out a way in which the mains of a gas company could become profitable during the daytime as well as by night. For his own company he could say that it was in that manner they had been able to bring down their unaccounted-for gas to something like 8 per cent. As to the economical aspect of the question from a consumer's point of view, he might state that on a recent visit to a house of 12 or 14 rooms he found most excellent heating apparatus in use, and on inquiry the occupier informed him that he heated the whole house and a bath included for something like 3d. or 4d. a day.

Mr. MAY (Canterbury) said at the present time, while fuel was so dear, it became very important that economy should be practised, so that all the heat obtainable from warming apparatus should be retained in the apartments, if possible. To effect this object with an ordinary open fire-place, he would suggest that the flue should be stopped just above the mantelpiece, and a wrought-iron flue 12 inches by 9 inches, in which were placed diagonally 2-inch circular tubes, open at both ends, and 6 inches apart, should be inserted. The lower end of the wrought-iron flue should be placed in the side of the brickwork above the fire, and carried inside the room to the room or rooms above, and turned into the brickwork flue at the top. As soon as the iron flue became heated, a current of air would be passing through the diagonal tubes, and the whole of the rooms would be warmed by the action of the one open fire. The same plan might be adopted with gas-stoves, a smaller flue being used.

Mr. BROADHEAD gave some details of the arrangements made by him for heating the offices connected with his works by means of gas. He had proved the economy of the process, but had failed in his attempts to get rid effectually of the products of combustion.

Mr. HARTLEY, in reply, said that he entirely agreed with Mr. Sugg in respect to enveloping a boiler with a non-conducting material in order to prevent waste of heat when it was desired merely to vaporize water or to raise the maximum quantity in temperature by the aid of gaseous or of other fuel, but such protection was not needed by any stove or boiler except such as were not intended to give off their heat by immediate radiation and convec-

ture. In instituting the comparisons which he (Mr. Hartley) had made, data had been taken which truly represented the maximum heating power which it had been found possible to obtain in practice from the bodies concerned. Mr. Paterson remarked that there was a vast difference in the published statements as to the heating power of coal gas. Such differences were not surprising, inasmuch as the heating power of any sample must necessarily depend upon the number or proportion of carbonaceous particles which the gas contains—the richer the gas in carbon the more heating power it will possess—and it would be found in the published proceedings of the association that, while one cubic foot of ordinary coal gas was stated to be capable of raising 650 lbs. of water 1° Fahr., the same quantity of cannel gas was put at 750 lbs., and these statements were quite concordant with his (Mr. Hartley's) experience. In so far as ventilation was concerned, he thought Mr. Sugg's remarks were a little beside the question. It was no doubt easy to obtain a free circulation of air, but when fuel, especially gaseous fuel, was being applied to the warming of rooms, it must be remembered that it was not desirable to have too free a circulation, as this would necessitate the consumption and waste of a large quantity of the material which was being burned for the purpose of producing heat. Mr. Sugg and Mr. Watson had both spoken of rooms heated by gas, but as he (Mr. Hartley) could not catch the figures named he could make no calculations on the observations to which he had listened; but he might state that the same amount of heat which would raise one pound of water one degree would raise about 50 cubic feet of air one degree in temperature. It was, therefore, easy to calculate what fuel should be required to make a room of given dimensions of a comfortable temperature. Mr. May mentioned a plan of carrying the flue of a stove into an upper room, and thus economizing heat. This might be a good plan under some circumstances, but the idea of warming two rooms, one over the other or adjoining, with one fire was by no means novel. In respect to Mr. Broadhead's observations, he (Mr. Hartley) might say that if a flue from a gas-stove were carried directly into the atmosphere, there would be at times great difficulty in getting efficient ventilation. As a rule, he thought that gas-stoves should be ventilated into chimneys. When possible, such stoves might stand in front of the ordinary fire-place, and the ventilating pipe should be carried some distance up into the chimney, while the fire-place opening should be, in respect to the room to be heated, hermetically sealed, otherwise there would often be a failure in ventilation. The closing of the bottom of the chimney would, besides securing upward draught, prevent the return of offensive vapours, and also the escape of large volumes of heated air up the chimney.

Mr. T. A. SKELTON (London) read the following paper:—

ON GAS STREET LIGHTING.

In treating the subject of the use of gas for street lighting before an association of practical men, able to bring a large amount of experience to bear upon the discussion which it is hoped will follow this paper, it is unnecessary to enter at any great length upon the introduction of gas as a means of street lighting; but, having briefly done so, I intend to submit to your notice these four divisions of the subject:—

1. The three means available for utilizing the light usually wasted in street lamps—viz., radiation, refraction, and reflection.
2. The catoptric lamp.
3. Lighting by rod.
4. Lamp supports.

These I will endeavour to illustrate both by diagrams and models. As you are aware, the use of gas for street lighting was first introduced into London in the year 1807, and the brilliancy of this new illuminating agent soon rendered the oil lamp an obsolete contrivance.

The earliest form of gas lantern was constructed with a metal roof. We have here a sketch of one of these from Lincoln's Inn Fields, London. These metal roofs were probably whitened on the inner side, with the object of throwing down some of the light radiating upwards, but, soon becoming discoloured, must have been ineffective, the only result being to prevent the light illuminating the adjacent fronts of houses much above the level of the flame.

The first improvement in gas lanterns seems to have been that of glazing the roof, permitting the light to radiate in every direction.

For many years, however, the mere introduction of gas for street lighting was a sufficient improvement to satisfy the public, then long accustomed to the faint glimmer of oil lighting, and so 40 years passed away without any attempt to improve gas street lamps by utilizing the wasted light.

The public had then become used to gas lighting, and probably comparing the brilliancy of indoor lighting with the feeble effect of open air lamps, were quite ready to complain of the insufficiency of the street lighting. Local authorities, of course, threw the blame upon the gas companies, and asserted that either less gas was supplied or that the gas itself was of a less illuminating power than they had stipulated for, hence followed disputes, and various expedients were resorted to for ensuring the satisfactory performance of contracts.

Now, while the illuminating power may still be a subject of discussion and complaint (often without reason), the question of quantity has been satisfactorily settled by the adoption of the ingenious apparatus called a lamp governor, now in very general use. Nevertheless, it must be admitted that the public are still unsatisfied with the present insufficient street lighting, and speak with just contempt of a system that wastes the effect of more than one-half of the gas they pay for.

But while the public complained, and the authorities disputed with the gas companies, inventors were actively if not successfully engaged in attempting to utilize more of the light actually produced, it being apparent that if the light now uselessly radiating into space could be deflected into a useful direction, a sufficient gain of illuminating power would be obtained without incurring the great annual increase of cost, which a larger number of lamps, a greater consumption of gas or a higher illuminating power in the gas would entail upon the ratepayer.

To effect such a desirable improvement in street lighting there exists only the three means I have mentioned—viz., radiation, refraction, and reflection. Of these, *radiation*, while the simplest in application, is the least effective, from the dispersion of rays which it effects. The best application of this principle is that of placing opal glass or thin porcelain in the roof of the lantern. In a lamp thus fitted, you will see by the diagram that the light radiating upwards from the gas flame impinges on the under surface of the opal glass, and is to a great extent radiated or reflected back into the lantern, and through it to the pavement directly underneath, and thus far the opal glass has the same effect as a white opaque solid roof. The opal glass or porcelain, however, allows some of the light to pass through its substance, and to radiate from its outer surface in every direction in front of its plane, so that a small, but in reality inappreciable quantity of the intercepted light reaches the pavement and roadway from this source.

Refraction has the power of directing and concentrating light, but in its application to street lamps requires to be used in combination with *reflection*, as it is powerless to deal usefully with the rays of light passing through the roof of such a lamp.

The disadvantages attending the use of this principle, apart from the expense and weight of glass lenses and prisms, are, that its greatest power is attained when the lens is placed in front of the light, so hiding the flame itself, and that it is least powerful where most required—that is, out of the direct line of light, say in the upper part of the lantern above the level of the flame. No application of this principle to street lamps has yet been successful, nor indeed does it seem possible that it ever can be.

Reflection being the most effective means for diverting or concentrating artificial light, its application to street lamps has of course been the subject of many inventions. The simplest form in which reflectors have been applied to gas lamps is the common concave or parabolic reflector placed behind the flame. In some lamps two gas flames are used with two reflectors back to back between them; examples of this arrangement may be seen in the railway stations in this city. They can, however, only be cited as illustrations of what to avoid in street lighting, where it is essential to leave the flame itself visible in every direction at and below its own level. Where metal reflectors have been proposed as a part of the lantern, they have generally been some form of the solid roof with reflecting surfaces on the inner sides, reflecting the light back through the lantern, as shown in the diagram exhibited, and concentrating it immediately below or close around the lamp, a large portion of the rays of light is reflected across the lantern top to the opposite reflector, and thence by a second reflection downwards to the ground underneath.

Through all this series of experiments with solid roof reflectors and their variations, there is firstly the defect of cutting off all light from the house fronts; and, secondly, the greater defect of concentrating what light they are capable of reflecting immediately under the lamp, where, with a moderate gas flame, there would already be sufficient light, and of leaving the darkest part of the road (the intervals between the lamps) not only unaided but actually darker than before, and comparatively much more obscure by the excessively uneven distribution of light.

With such grave defects in all projected improvements in public lighting up to the year 1871, it is not surprising that local authorities were adverse to their adoption, and looked upon every new proposal as a merely fanciful variation of previous schemes which had already been tried and had failed, or gave no advantages equivalent to their cost.

It is remarked that up to the year 1871 inventors had not succeeded in allowing the light to pass out from the lantern, merely diverting it in its onward course in a manner analogous to the action of the modern catadioptric light-house light, of which we have here a diagram, and as the reflectors would be somewhat numerous, and be liable to damage as well as be difficult to clean, also to enclose them between sheets of glass, which while protecting them would only offer the same surfaces for cleaning as the ordinary glazing of the common lantern.

These are the essential points in which the "Catoptric" lamp differs from all previous attempts to improve street lamps. Here we have specimens of these catoptric reflectors, which are thus easily and perfectly fixed in the lantern. You perceive that the light radiating upwards is no longer wasted, neither is it concentrated below or close to the lamp, but it is thrown forward, dispersed, or concentrated, as may be required along the usually dark interval between the lamps, making the pavement appear a "continuous ribbon of light," according to the graphic description given by the *Standard* of the first exhibition of this lamp upon Waterloo Bridge in October, 1871.

In application, this improvement is capable of almost infinite variety in detail, and it can be adapted to lamps of any form and size. Ornamental effects may be produced by the use of fluted glass or of coloured glass in various ways. Some common quick lime, enclosed within the cases, leaves no moisture to condense upon the inner surfaces of the enclosing glasses, but even without this precaution the power of the reflected light is but little impaired by such condensation, but for the sake of durability it is advisable to keep the cases dry, and air and water tight.

This specimen is the form in which this improved lamp is now manufactured—a simple 14-inch square street lamp. These cases of reflectors are easily removable, so that they may be replaced in case of damage without removing the lamp, and they can be readily repaired by any workman of ordinary skill. The gas flame must be placed at such a height that the top edge of the flame is just level with the bottom of the side reflector, and is thus visible in every direction at and below its own level as in a common lantern. Where attention has not been paid to this point, the effect of experiments with trial samples could not be satisfactory, as the flame would be out of focus with the reflectors.

The specimen cases I have here will be of interest, as showing the several improvements which have been made in the manufacture. This, one of the first pattern made, has actually been in use in the High Street, Southampton, for twelve months, and was then removed only in consequence of fracture of the outer glass by a stone, yet the silvered strips are uninjured. The improvements since made upon this pattern are shown in this reflector; it is thinner, the glass is secured in rebates without so large a putty-joint exposed. A screw plug allows the lime-tube to be removed and replaced, and the silvered glass reflector-strips are coated with thin lead for ensuring durability and giving greater strength. With these improvements the reflectors may be considered perfectly adapted for general street use.

The lighting power of these catoptric lamps may be estimated by a reference to the diagram. Thus of the light passing through the 180° on each side of the vertical axis, about 10° are intercepted and lost by the disc of the lamp-governor; about 60° are given to the ground within a distance of 30 feet, and about 15° are usefully employed beyond that distance in lighting the road and footways, but the remaining 95° (more than one-half of the light produced) is usually wasted in the common glazed lanterns, except so far as adjacent houses may intercept a small portion.

Now, about 10° of this quantity is unavoidably lost by the necessary opening for the escape of the heated air above the flame, but 53° of the remainder are in this example of catoptric reflectors actually intercepted and diverted into the space previously illuminated by only 15° of direct light. With this great addition of lighting power, even after allowing for some loss of intensity by reflection, the darkness of the intervals between the lamps is practically overcome. I need hardly upon this occasion enter upon the subject of cost, further than to state that for ordinary street purposes the catoptric lamps will cost in first outlay about 20s. to 25s. per lamp more than common lanterns, and that the cost of repair will not be much, if anything, beyond the usual amount. If you are satisfied that a very considerable gain of lighting power *and a more even diffusion of light* are obtained by their use, their real economy will be apparent to you, without my troubling you with the details of the comparatively slight extra annual cost thereby incurred.

In the third division of the subject of this paper I may safely affirm that lighting street lamps by a rod is steadily gaining favour, and I venture to think that improved means of opening and closing the bottoms of lamps for this purpose, especially if it gives less shadow than the present system, will remove the chief difficulties which have hitherto retarded its general adoption. The plan hitherto has been to hinge one-half or one-quarter of the bottom glass of the lamp as a flap to be raised by the rod on its being thrust into the lamp, falling back to its place on the withdrawal of the rod. The result, in practice, is an increase of shadow under the lamp, and that most of the lamp bottoms are broken, after a short time, by the rod being roughly thrust through all parts, and the flame is at last exposed to the wind without any protection whatever, to its great loss in steadiness and lighting power.

The patented improvement I beg to introduce to your notice (of which a sample is fitted in this lamp) is that of a sliding or revolving quadrant of thick glass fixed to a bar encircling the gas-pipe at one end as a pivot, and having an arm of wire at the other, projecting beyond the square of the lamp. The bottom of the lantern is glazed with two thick pieces of glass, leaving an opening to be covered by the quadrant. The lamplighter opens and closes

this space by striking the wire arm outside the lamp, hence breakage is almost impossible. This plan is now in use in Trafalgar Square in some catoptric lamps fixed there, and it is especially suited for those lamps as it permits the governors to be placed close to the bottom of the lantern.

My last division—lamps supports—is not an unimportant one, and a few words upon it may induce some gentlemen present to favour us with their experience upon the subject, two systems appear to be in use—firstly, the basket in which the lantern is suspended by its eaves; and, secondly, the bracket on which the lantern stands and is secured by nuts and screws attached to its feet.

The first seems to wear out the lantern by constant friction at its bearing, and the lantern is seldom seen in a perpendicular position, while the rods at the corners, and the broad flat lower bars, add very greatly to the shadows thrown upon the pavement and across the road. The second system—the bracket—seems to be the best, and is in general use where the lamps are of better than ordinary class. They are, however, too often heavy in design, and throw down large shadows under the lamp.

Wrought iron is better than cast for general street use, but where cast iron is preferred, the brackets should, I think, be made of thin plates edgeways to the flame, and utility should certainly take precedence of ornament in designing them.

These may seem almost trifling details, but to obtain perfect street lighting too much attention to detail can hardly be given; and although here it may be unnecessary to insist upon so plain a fact, yet in many places it might be advantageous to explain that as gas is consumed in street lamps in order to light the streets, its light should not be wasted in the clouds, or be obscured either by dirty glass, thick bars, or heavy brackets.

Mr. GARNETT (Ryde) wished it to be quite understood, in any observations he made on the interesting subject of street lighting, that he bowed unhesitatingly to the admirable natural and scientific principles brought into play by Mr. Skelton in his invention. But he thought on an occasion like the present, when they were met for the purpose of deriving information from all sources, and seeing that, more or less, every member of the association had to do with local boards, corporations, and other public bodies who had to pay for street lighting, this was a subject which could not be too well ventilated. He therefore wished to bring under the attention of the meeting the Westminster lamp, an invention of Mr. Sugg. He (Mr. Garnett) resided at Ryde, in the Isle of Wight, and in that town there was a pier half a mile in length running out towards the celebrated roadstead of Spithead. Ryde was exposed to the full force of south-easterly and other gales, and such was the effect of these gales on the street lights that the gas company were sometimes asked for as much as £40 in the way of fines for lamps blown out. He was called upon by the authorities to light the pier, and, by means of the lamp to which he had referred, he was able to succeed in doing so to their entire satisfaction. The desideratum was a lamp which would reflect light upon the deck of the pier, and not be liable to be extinguished even in the strongest gale. In November and December last these gales prevailed to a considerable extent, and although during their continuance scores of lamps in the town were blown out, not one of those on the pier was extinguished or even wavered. The Westminster lamp reflected the light admirably on the deck of the pier, so that the rails of the tramway could be distinctly seen all the way along; it was easily cleaned, and there was an admirable method of opening and closing the orifice where the torch was introduced. He believed that some of these lamps had been fixed on the new pier at Beckton.

Mr. M. OHREN asked whether any photometric test had been made of the increased lighting power of the catoptric lamps.

Mr. SKELTON said a photometric trial had been made at Chatham Dockyard, under the Royal Engineer officer in charge of the works, and it was found that the equal intensity of light and shadow between two lamps, 60 yards apart, one being the catoptric and the other common, each having exactly the same flame of gas, was, at a point 20 yards from the common lantern and 40 yards from the catoptric lamp, which was thus proved to be throwing its light twice the distance, or giving equal to four times the illumination of an ordinary lantern. This trial was considered so satisfactory that he had since received orders to supply a number of catoptric lamps for lighting the dockyard at Chatham.

Mr. SUGG, in compliance with the wish of the president, then gave a description of the Westminster lamp, illustrating it roughly on the black board. He said: The Westminster lamp was octagonal in form, and was provided with a ventilator at top a little different to those in ordinary use. It was composed of two concentric cylinders, perforated with elongated holes; the cylinders were so arranged that the holes did not come opposite each other, and so the wind could not enter directly into the lamp and blow upon the flame; but after passing through the first or outside cylinder it struck the blank space of the internal one, and so was made to reverberate again into the air. The top was filled in with porcelain plates instead of glass. These served to reflect the light upon the ground round about the lamp, and prevent the upcast rays from being lost. Of course it did not direct them in the same manner as the more scientific Fresnel refractor of Mr. Skelton's lamps, but merely threw them on the ground round about the lamp-post. The porcelain tops were first introduced by Mr. Woodall, of Burslem. They were now made use of a great deal in South America and in Burslem, but not much elsewhere in England at present. The Westminster lantern differed from all others in the mode of fixing to the lamp-post. The glass bottom was an octagonal cone, and forms its own support, terminating in a gun metal socket which dropped into the top of the post, where it rested very firmly. The socket having been greased when the lantern was put into its place could at any time be easily lifted out, although no force of wind would move it. It was lighted and extinguished with a torch, for which purpose there was a flap bottom, which was fastened by a very simple balance bolt. A touch from the lighting pole on this bolt caused the flap to fall open, and after the lamp was lighted the flap was closed by the pole, the bolt slipping into its place by itself, and preventing the flap from being blown open by the wind. These lamps were first made for Beckton pier, where they had been in use ever since the opening of the gas-works there. He was not aware they had been so successfully employed by Mr. Garnett, and begged to thank him for his kind remarks.

Mr. SKELTON said he did not for a moment look upon Mr. Sugg's lamp as a rival to his own. Indeed the object of each was different, and both lamps were useful for the special purpose for which they were designed. If in street lighting the lanterns could be put sufficiently close together so that the light thrown downwards was sufficient, no doubt that would be a far pleasanter and better way of illumination. But it was impossible in ordinary streets to get the authorities to go to that expense, and it was on this account that he had been induced to suggest the means now exhibited for throwing the wasted light into the dull intervals, and not below at all. Where the lamps could be arranged in such close order that the economy of these wasted rays was not of so much importance as a strong downward light, the invention of Mr. Sugg was an exceedingly useful and admirable contrivance.

The PRESIDENT, in proposing a vote of thanks to Mr. Skelton, said the invention which he had just brought under the attention of the association was a very ingenious one, and an illustration of the truth that wherever a man of talent devoted his thoughts and intelligence to a particular subject, it generally resulted in the production of something highly ingenious and useful.

Mr. J. R. FRITH (Runcorn) read the following paper:—

ON A PLAIN SYSTEM OF BOOK-KEEPING BY DOUBLE ENTRY, SPECIALLY ADAPTED FOR GAS COMPANIES.

The reasons which prompted me to prepare a paper on this subject are the knowledge of the very imperfect way in which many gas companies have their books kept, and consequently the uncertainty of a proper return being rendered to the shareholders; a desire to assist those secretaries and managers who have a wish to secure an improved system of book-keeping; and, further, a longing to see the books of our gas companies placed on a sound basis, so that they shall not be subject to the remarks concerning them which have been made during the last few years.

When we read of a gas company with a capital of upwards of £370,000 working without (what one would suppose is in the possession of every respectable tradesman) a cash book, we cannot but express our astonishment and regret.

I am well aware in many gas offices a good system of book-keeping is carried out, at the same time I know in others there is neither system nor correctness; indeed, some of the books of gas companies which have come into my hands have been a source of annoyance and uncertainty to every one connected with them.

There are many who imagine that the system called "double entry" means double labour, and as many managers in country gas-works are secretary, engineer, manager, and almost everything else, and have plenty of duties to perform without, as they think, additional work, consequently do not take the trouble to inquire into the merits, and lose the advantage of a system which is beneficial to them in time and accuracy. To all who view "double entry" as double labour I would say a correct system is not so, but really less, and when done carries with it the assurance of truth and correctness. An old proverb says, "If a thing is worth doing, it is worth doing well;" and let the book-keeping of gas companies be no exception to this rule.

In arranging the accompanying accounts, I have endeavoured to combine brevity with clearness, so that any one having an ordinary knowledge of book-keeping may at once understand them.

I shall now endeavour to show what "double entry" means, and then attempt an explanation of the books required to carry out the system I now lay before you.

Double Entry.

Double entry is that mode of keeping books which always shows two accounts in connexion with each transaction; for instance, if the gas company sell coke to Wallace Bruce, there are two accounts affected thereby—first, Wallace Bruce is debtor for having received the coke, and coke account (or, in reality, the gas company) is creditor for having sold it. Again, if the gas company purchase coal, two accounts are in like manner required—first, coal account (or the gas company) is debtor for having received it, and the coal company is creditor, being the seller. In these examples you will see the reasons for the term double entry being used in contradistinction from single entry, where only one account is represented.

There are few commercial undertakings where so large a number of nominal accounts (such as the accounts for coal, meters, &c.) are required as in gas companies. It will be seen as we proceed how suitable this mode of book-keeping is to them.

The desirability of keeping each account distinct so as to show how much per 1000 cubic feet each department has cost, and, on the other hand, how much has been produced, is acknowledged by all companies, and looked upon as a necessity, without which no system of books can be complete.

The principal books required to be kept by gas companies are sales day book, gas rental, collectors cash book, cash book, journal, ledger, and balance book, and I will now endeavour to explain these in detail. There are other subsidiary books so universally kept as now to need no mention.

The Sales Day Book.

This book is for the entry of all goods sold, such as coke, tar, ammoniacal liquor, &c. (special books being provided for fittings and gas), and is ruled with three money columns; the first for coke, the second for tar, and third for sundries. There being few entries for ammoniacal liquor and other smaller sales during the month, it is not necessary to have separate columns for them.

The first entry is as follows:—

Day Book, folio 1.

Ledger Folio.	July 19, 1872.	Coke.			Tar.			Sundries.		
	Tims, Edward	£	s.	d.	£	s.	d.	£	s.	d.
	T. Cwt. Qrs.									
41	2 9 3 Coke . . at 7s. 6d.	0	18	3	0	0	0	0	0	0

which is entered from the machine book, and the amount carried out into the coke column, and so with the other accounts for the month. With such things as fittings used in branch pipes, and time laying mains, it is better to have a separate book for each, giving the particulars of all branches laid and goods used; also showing the length and size of each main, and the time occupied.

At the end of the month each column is added up, the particulars of the third (sundries) division are extracted, and the total of each account is entered at the end of the month's sales, thus giving the total amount of sales during that time; and each account is then entered at the foot to be journalized (see "Sales Day Book," folio 1).

The Gas Rental.

An able paper was read, and the form of this book was laid before the members of this association in the year 1865; and as the form of it resembles mine, I need not now dwell upon it, but mention a few alterations made to it in the form I lay before you.

1. It is made to last twelve months, or four quarters, "for once writing out the names."

2. I object to having more than one receipt column, because I consider there is greater liability to error with three columns than with one.

3. The "removals." When a customer leaves during the quarter, the particulars of his account are entered into the rental for the next quarter, as Joseph Simpson, who left and paid his account on the 30th of May, 1872. The cash paid appears in the March quarter, but the particulars of the account appear only in the June quarter; and to balance his account there, it is necessary to write "transferred" in the date paid column, and enter the amount so transferred in the cash column. In order to balance the rental with "the collector" (ledger, folio 29), it is necessary to deduct what is termed the "over credits" from the arrears carried forward, which gives you, if the postings are correct, the balance required.

To balance the Dr. and Cr. columns, add the "over credits" to the amount of the Dr. column, and add the arrears carried forward to the Cr. column, and the Dr. and Cr. amounts agree as shown.

The Collector's Cash Book.

The collector when receiving an account for gas, &c., gives a printed cheque receipt, leaving a counterpart in the book upon which is the name of the customer, the amount paid, and the discount allowed. This amount is entered in the collector's cash book, where there are three columns—the first for gas-rents, &c.; the second for discounts; and the third for ledger or coke, &c., accounts.

This account should be made up weekly and the money paid into the bank, and I consider these entries should be frequently and carefully audited.

In posting to the rental, the total amount paid by each, including discounts, is entered.

The ledger accounts are copied into the cash book, to be posted with the other accounts received.

The discounts are journalized each quarter (see "Journal," folios 5 and 9).

If the postings from the collector's cash book are correct, the total of the gas-rents, &c., and the discounts, &c., for the quarter will agree with the total of the credit side of the rental, with the transfers from the previous quarter added thereto.

The Cash Book.

I think this book requires little or no explanation from me. All cash received is entered on the debit side, also all cheques drawn on bankers; and all payments made, including cash paid to bankers, are entered on credit side. Cash is thus debited for all cash received, and credited with all cash paid.

The posting of the cash book is direct to the ledger, and it must be borne in mind that all debit accounts in the cash book will appear on the credit side of the ledger, because, whilst the cashier has received money, and therefore debits himself with it, the party who pays it has to be credited for having so paid it.

I like the plan of posting direct from the cash book to the ledger, as it can be done at once, and therefore you can have the particulars of each payment posted daily, without waiting until the end of the month before journalizing the cash, as is done by many who keep their accounts on the double-entry system. It also has the additional advantage of preventing errors in copying.

Different companies have a different way of dealing with their cashier. Some allow him to receive gas-rents, &c., and out of such moneys to pay wages, &c., paying the balance into the bank; others, again, prefer the gas-rents, &c., to be all paid into the bank as received—say weekly—and provide for wages and sundry expenses by a cheque. I have shown it the latter way, and therefore there is always a balance at the commencement of each month. At the end of each month the sum total of the cash on the debtor side is entered at the bottom of the page, and the amount of balance at the commencement of month deducted therefrom, thus showing the amount of money received, and then journalized thus:

		£	s.	d.	£	s.	d.
Fol. 1	Dr. Cash for cash received this month. . .	610	10	5			
	To sundry accounts posted from C. B. .				610	10	5

The same procedure applies to the creditor side, and the same plan is also adopted at the foot to show how much money has been paid during each month, and is journalized accordingly.

The Journal.

This is one of the most important books, and I think I am correct in saying one least understood.

All transactions, excepting details of sales day book and cash accounts, are first entered here before being posted to their several accounts in the ledger.

It will be obvious, from what has been already stated, that the monthly totals only of day and cash books are all that need journalizing.

You will observe there are two money columns on each page—the first, or left-hand column, is for the debtor accounts, and the other for the creditor accounts in each case.

The first entry in the journal is a transfer of stock to the coal and fitting accounts, because coal is debtor to stock at the commencement of the half year for the coal in hand; and the same remark applies to fittings, therefore it is entered thus:

		£	s.	d.	£	s.	d.
	Dr. Coal account.	10	0	0			
	,, Fittings	390	13	3			
	To stock of materials . .				400	13	3

Here let me observe that the debit accounts must precede the credits in each case, and the amount carried to the debtor or left-hand column, and be on a line with the posting account (in this case coal account), and must always commence with debtor; the same applies to the creditor side (or right-hand column), and the entries must begin with the word "To."

The two columns must be added up at the bottom of each page, and carried forward from page to page to the end of each quarter; and in no case must there be in either the debtor or creditor columns any amount other than the posting amounts. The totals at the end of each quarter will be found (if posted correctly) to agree with the totals of the ledger balance book, which will be hereafter described.

Several advantages are to be derived from keeping the debtor and creditor entries distinct; any error can be more readily discovered; there is less liability to make mistakes in posting the debits for the credits and *vice versâ*, besides which it is a complete check on the ledger.

It is necessary to observe the following rules in entering the journal:—

1. Enter the invoice for goods received according to their dates.
2. Any special transactions occurring during the month, as on Aug. 12.
3. The cash received and cash paid during the month.
4. The sales day book.
5. Discounts, &c., allowed during the quarter.
6. The rental for the quarter.

1. *The Invoices.*

Here we have an invoice for cannel received, and it is entered (see "Journal," folio 1):

		£	s.	d.	£	s.	d.
	Dr. Coal account (net amount)	50	4	9			
	To the Coal Company, J. B., No. 1 .				50	4	9

Coal account having received this amount is debited with it, and the Coal Company having sold it is credited with it. It will be observed here that the particulars of the invoice are not entered, but there is reference to the invoice book, No. 1, where the invoice has been pasted; and on referring to that number you have the invoice itself, without wasting time in copying it into the journal.

2. *Special Transactions.*

Here we have on Aug. 12 the half-yearly meeting of shareholders to declare a dividend, and a dividend of 10 per cent. is declared, which amounts to £1200; therefore this amount requires to be transferred from the dividend account (to which the profit for the half year has been carried) to the proprietors, as being dividend due to them (see "Journal," folio 3).

3. *The Cash Accounts.*

Cash is debited with the net total amount received, and is posted to a cash account in the ledger, folio 21, and sundry accounts are credited with the total amount paid to the cashier; and these sundry accounts having been regularly posted from the cash book to the ledger, are here ticked off, showing that they are already entered.

Totals of cash payments are also journalized in a similar way.

It will now be seen that the journal contains the aggregate amount of all cash receipts and payments, and the cash debits and cash credits in the ledger must agree with these. On reference to the balance of the cash book, Dec. 31, 1872, folio 7, and the balance of cash in the ledger, folio 21, the balance is the same.

4. *The Sales Day Book.*

Here, again, we have debtor sundry accounts posted from sales day book. The accounts have been daily posted to the debit of their respective accounts in the ledger, because these parties have purchased coke, &c.; but the respective nominal accounts require to be credited with the total sales, and therefore we say, "To coke." Observe these total credits agree with the total sales during the month.

From what has been said, the remainder of the entries in the journal will be clear until we come to the

Closing Entries.

The first item we have is the estimated amount allowed from profit and loss account to discounts to cover the probable amount which will be allowed on the December quarter's rental, which is put at 3 per cent., because we show the gross rental on the credit side; whereas that is not the sum actually to be received, but that amount less discount.

The next entry is for the transfer of all new investments during the half year to "Investment in plant."

We next transfer to the debit of "Profit and loss account" the whole of the revenue charges during the half year, and this balances the whole of the nominal accounts (say, coal, &c.); next we close gas-rental, &c., by transferring the balances of these accounts to the credit of profit and loss account, which is credited with all sales of gas and residual products during the half year.

The final entry is the balance of profit and loss account, which is the net profit for the half year, transferred to dividend account.

The closing entries having been posted to their respective debtor and creditor accounts in ledger, and extracted from the ledger to the balance book, the aggregates of the journal, ledger, and balance book must be alike, otherwise the postings are incorrect.

The Ledger.

I call this Ledger B, supposing there is a Ledger A, from which all balances are brought forward, to commence with the 1st of July, 1872.

In the ledger the accounts are ranged in the following order:—

1. The capital accounts.
2. The revenue accounts.
3. The creditor or tradesmen's accounts.
4. The debtor or sales accounts.

To give greater ease in posting and in extracting the balances, having all accounts of the same denomination following each other.

I have only shown one ledger, but where there are many coke, &c., accounts, it is better to have a separate ledger for them.

It is not necessary here to describe the manner of posting the ledger.

The Balance Book.

To show the correctness of the ledger, we have recourse to the balance book, in which are entered, first, the balances extracted from Ledger A, the debtor and creditor totals of which, it will be observed, agree; from that we find there is the same on the debtor side of the ledger as on the creditor side, and we also learn that the balances from the old ledger are correctly brought forward. We have finished with the balance book until the close of the first quarter, when all the debtor and creditor entries during that time (except the balances) are added up in red ink on their respective sides in the ledger, and are entered in the balance book; and if the postings for the quarter are correct, they wil be the same on the debtor side as the creditor side, and also will correspond with the total amount of the journal for the quarter ending the 30th of September; if it is not correct, it at once shows the postings to be incorrect, or the additions wrong, and they must be examined until the error is found.

This process is repeated for the trial balance at the end of the half year.

The second or half-yearly trial balance being correct, we enter the closing entries, which have been already fully described to you, and a reference to the book itself will show better than by description how easily the debtor and creditor general balance is arrived at, and how impossible it is under this system for any errors to pass or escape notice.

The Balance-Sheet.

As it is very important that a clear statement should be set before the shareholders at the half-yearly general meeting, I have prepared a balance-sheet which, at a glance, shows the working of the company for the six months; and if copies of this are sent to the shareholders, they can compare and see how the undertaking is progressing.

If I have omitted to mention anything, it is because I know most of you are acquainted with book-keeping, and therefore have endeavoured not to trouble you with unnecessary explanations.

I feel firmly persuaded that if this system was more universally adopted, it would save managers and secretaries much superfluous labour, and there would be less anxiety both on the part of the shareholders and managers.

At the conclusion of his paper, Mr. Frith exhibited a specimen set of books prepared on the double-entry system for a period of six months.

The PRESIDENT said the paper presented by Mr. Frith was an exceedingly suggestive paper, and would, no doubt, be read with great interest in the transactions of the Association.

Mr. RANDALL (Tottenham) read the following paper:—

ON THE COMPUTATION OF GAS ACCOUNTS ARISING FROM THE NON-REGISTRATION OF METERS.

The writer submits this paper for the consideration of the members, feeling assured that the subject is of great importance, and one which every official would be pleased to have solved.

Computation from non-registering meters, according to the present system, is in a very unsatisfactory state, there being no established rule laid down for its regulation, every gas company adopting more or less a method of its own (considered by the consumer an arbitrary principle), founded upon the basis of a corresponding period's average consumption; which, it must be admitted, often leads to unpleasantness and dissatisfaction, and, to a certain degree, is unjust to the company.

Cases can be cited where affirmation has been made that, from a pure principle of economy, the number of lights has been curtailed since the 12 months preceding the quarter in which the meter has ceased to indicate, or certain rooms have been partially or wholly unoccupied. The consumer being a person of acknowledged integrity, the gas company (or its officials) placing implicit confidence in the statement, cannot conscientiously insist upon an average of former periods. Again, on the other hand, the consumer has acknowledged to having increased the number of lights within a corresponding period (as stated above), and leaves the matter in the hands of the company to deal justly with. Also a meter has ceased to register within the first quarter of its being fixed, therefore there is no consumption to base the average upon. Now it must be acknowledged that in either of the above-mentioned cases the officials are placed in a sort of dilemma, and prepare themselves for a sharp contest in the shape of a paper war or discussion. The opponent may possibly be open to conviction upon the average principle, and acknowledge rather dubiously to an accidental derangement of the meter, which the company has endeavoured to rectify apparently in a spirit of justice; but there are others who declaim most vehemently against the desire of the company and its officials to take them at a disadvantage, preferring the interposition of the law courts to the system in use by some particular company.

There is no gas company, I am confident, that is desirous of the arbitration of what is ironically termed "justices justice," but would in preference, and do, in many cases, sacrifice to a conciliatory policy, well knowing that it is worth something to enjoy the confidence of the consumer if business is to be done pleasantly in the future. Therefore these facts, strengthened by similar cases which have come under my own observation, have induced me to attempt to lay before you the question of computation, in hopes that the discussion that may arise therefrom may take a practical form, and serve as a beacon for future guidance.

1. A uniform rule to be adopted by all gas companies, according to the number of burners, whether jets or Argands, admitted to have been in use during the quarter in dispute, and number of lighting hours, estimated at per burner. A burner to be tested for that purpose, and compared with average quarters of corresponding periods, or the consumption ascertained by meter for a given number of nights, and an approximation arrived at by simple proportion.

2. Computation unfair in cases where proof is shown that lights have been dispensed with entirely.

3. Computation unjust to gas companies where it has been positively ascertained that additional lights have been fixed.

4. Computation not applicable in cases of new consumers.

There are also cases where it is necessary to draw the attention of the meter manufacturers and the official meter inspector, the importance of which cannot be denied, and which can be vouched for as follows:—

The inspector for the company which I have the honour to represent has tested meters for non-registry, but finding that the test-dial has accurately recorded the quantity passed from the 5-feet holder, has refixed them with the same result of stationary indices at the subsequent quarter; also meters have been fixed working backwards to 9000 instead of 1000 feet, and 90,000 instead of 10,000, and so on *pro ratâ*.

Lastly. It cannot be too firmly impressed upon the minds of the official meter testers, in cases of disputed accounts, when their abitration is appealed to, the importance of furnishing the consumer with an accurate reading of the index, as we have had cases where the official in question has erred in 10,000 feet.

Much might be stated regarding the position which meters (either wet or dry) occupy, also the preference for dry or wet meters, with the view of reducing the number of non-registering meters to a minimum, but the title of this paper precludes the writer from entering into this branch of the subject.

It was the intention of the writer to have given a tabulated statement showing results of various tests made with non-registering meters, and the ultimate adjustment of the disputed accounts; but, as each official can produce cases from his own knowledge and experience, it would trespass upon the time of the meeting.

With these remarks the writer closes this somewhat crude and hastily prepared communication.

Mr. GARNETT (Ryde) said, without attempting to enter upon the merits of single or double entry, there was one little matter suggested itself which he might mention. All present were agreed as to the importance of good book-keeping, though all perhaps might not agree in the special form now proposed. A short time since he was himself engaged upon an arbitration in reference to the transfer of gas-works by compulsion from a company to a local board. The accounts of that company, though kept by single entry, were so well kept that the opposition of the corporation was thus far disarmed, that their counsel were instructed not to challenge the company's accounts. The point, however, which he wished to mention was this—that a form of accounts was furnished in the Gas-Works Clauses Act, 1871, and he had no hesitation in saying it was unquestionably the very best set of accounts ever yet published. He was quite sure that if gas companies would adopt it, they need have no fear as to the result of any investigation of their affairs, either by a parliamentary committee or a court of arbitration.

A vote of thanks was given to Mr. Frith and also to Mr. Randall for their papers.

The meeting then adjourned.

(To be continued.)

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

TUESDAY, JUNE 10.

The PRESIDENT (Mr. M'Crae) delivered the following

INAUGURAL ADDRESS.

Gentlemen,—You honoured me by electing me president of the North British Association of Gas Managers. I very much fear, however, that it will be found that the duties of the office have and will be very imperfectly performed; nevertheless, I take shelter under what I believe to be the fact, that all the members of the association are more desirous of helping each other by interchanging ideas than by criticizing the defects that may exist in the manner in which your president performs his duty. With this before my mind, I now venture to address you, according to custom, and in terms of the circular convening this meeting.

Our meeting on this occasion is somewhat peculiar. Hitherto there has been prepared a programme of business and of papers, and the consequent discussion of these. This year our course is quite changed.

In consequence of the recommendation of your committee, which will be submitted for your acceptance—that of this association amalgamating with the British Association of Gas Managers—until the result of your deliberations on that recommendation is known, we must so far depart from the usual duty of appointing office-bearers, committee, &c.

I will not at present speak of the proposed change; there will be an opportunity afforded me when we are discussing the matter.

I may be permitted, in a word or two, to say that the year now ended has been a very trying one for gas managers, the chief cause of which has been the scarcity of coal. Last year, at our meeting, the then very high price of coal was looked upon by us as very ominous; but I dare say you all very well know how the price has increased enormously since then, and, so far as high-classed cannel is concerned, there is not yet any sign of a reduction.

So long as coal is used in the production of gas, whatever the price is, it must be obtained; but it is a serious matter when coal cannot be got in sufficient quantity in the dark months of the year to meet the wants of the consumers. It is not too much to say that those who are the cause of such a state in our coal supplies are under a grave responsibility to their country, as it is quite evident, so far as I can judge, that not only will the general trade of our country be crippled thereby, but will ultimately be taken from us by our foreign friends where coal and labour are abundant.

I would earnestly recommend that every gas manager, wherever located, should make it his endeavour (as I doubt not you all do) to improve the present mode of carbonizing the coal. I think that much less coal might suffice, in producing all the gas that is required, than what is at present used. In Scotland no gas manager should be satisfied (if he is using the average quality of cannel coal which Scotland produces)—I say if this is so, no gas manager should be satisfied with less than an average of 11,000 cubic feet per ton of coal used over the entire year. There are some matters and improvements more especially applicable to large than to small works. What I have just stated, however, is applicable to every gas-work, and especially to small works. I am aware that some gas managers get the quantity of gas per ton of coal which I have named, but I am also aware that many, very many, do not reach that quantity. I do not make any charge against any one; by no means. My object at present is to impress upon you the urgent necessity there is, under present circumstances, for every effort being put forth to economize coal.

To obtain the result which I have named, all you have to do is to take great care in setting your retorts, so that they will take and maintain high heats. Put no more coal into the retorts than what the heat is capable, in the space of three hours, of driving off the quantity of gas per ton already named. It will not do, when coal is from £1 to £3 per ton, to allow that which can be converted into permanent gas to pass into the tar-pit.

Some may be disposed to say that the retorts and bricks would not last so long if they were subjected to such high heats. Quite true; they would not. First get the very best retorts and bricks that are within your reach, then use them as indicated; and, while your retort account will certainly be increased beyond what it was formerly, you will find that you are quite able to stand that, and have something over.

Take an example. Suppose a retort to be kept constantly at work for one year, during which you carbonized say 250 tons of coal, and produced at the rate of 11,000 cubic feet per ton, you would have 2,750,000 cubic feet, and your retort and furnace used up. Again, suppose you take another retort, you put in heavier charges, and give longer time, whereby you use only 216 tons of coal during the year, getting, on an average, say 9500 cubic feet of gas per ton, or a total quantity of 2,052,000, and your retort and furnace capable of doing duty (although somewhat shaky) for another year. The difference in these examples is that, by the light charges, short time, and the using up of your retort, you have more gas by 698,000 cubic feet, which I take, at 3s. per 1000, gives you £104 14s. to restore your retorts.

I am aware that some may be disposed to say that the gas so manufactured will be worse to purify, and the cost of the material used for purifying will consequently be increased. Such an idea is, to a certain extent, debateable; it is a very nice question whether you eliminate and pass along with the foul gas a greater amount of impurities by light and short-time charges than by the heavy and long-time charges. If this is looked into carefully, many will be surprised to find that the long exposure to the heat of the retort, the external part of the charge of coal, which is the first part carbonized, while you are waiting till the heat penetrate, if possible, to the interior of the charge of coal, is more mischievous in giving off impurities than what is generally supposed.

But, even though there should be a little more cost in purifying, the cost is so trifling that one pound of coal ought not to be wasted to meet that or similar objections.

Not only has the coal been increased in price, labour also has been much in demand, and, as a consequence, risen in value. This has affected the operations of gas-works and the cost thereof to an extent that the introduction of mechanical power wherever it can be applied is now a necessity, and doubtless will be resorted to to an extent not hitherto attempted.

While speaking on this matter, I may remark that the steam stokers already in existence are well spoken of where suitable means are adopted for their application. I am hopeful that at no very distant date we shall have machines capable of drawing and charging the retorts in whatever form the settings are. Already your vice-president has patented a machine wrought by hydraulic pressure which is simple, inexpensive, and, I am informed, doing its work well. There is a wide field here, gentlemen. My advice to you is to enter it, bring all your thinking and mechanical powers to bear upon the invention of improved machines or the improvement of those already invented.

I am not here to complain that working men have got their wages so much increased; by no means. It is always to me a pleasure to see good workmen well paid, although it is sometimes unpleasant to see the means adopted by the men to obtain their desires. I do not object to working men combining for any purpose that is likely legitimately to improve their position, but it is a mistake when such combinations lead to strikes.

Strikes appear to me to be bad wherever resorted to, and seldom do such means produce the ends desired.

Strikes always tend to alienate the employer from the employed, and *vice versâ*, and utterly destroy that sympathy with and respect for each other.

While on this point of men and wages, I feel it to be my duty to refer to the very important movement which has been discussed at previous meetings of this and similar associations—viz., the Sabbath labour question. This is so important that it deserves more than merely a passing remark. I am quite aware that the apparatus of many gas-works will not admit of entire cessation from work on the Sabbath. We should ask ourselves whether we should not endeavour as soon and as efficiently as possible to get this cause removed.

It does appear to me an insurmountable barrier in the way of men feeling contented and happy, if they are kept at their work 84 hours each week, without a break, during the entire year, at least those who are permanent. I do not think that any amount of daily wage can compensate for this state of things. It is no wonder to me when I hear of men being dissatisfied; the wonder is why any are apparently satisfied at all. Eighty-four hours per week, and one set of the men working when all others are or ought to be sleeping! Men in such circumstances must in the long run lose that self-respect, love of home, love of all that is noble and ennobling, from the very fact that they have not an opportunity to be otherwise, even although a little cessation was given from labour on the Sabbath. I do not think this evil, although mitigated, would be quite removed. No man can be expected to do duty 12 hours each day and night, even for the six days or seven nights weekly.

The remedy is eight-hour turns, having three sets of men, instead of two, and although there may not be any stoppage of work on the Sabbath day, there would always be two-thirds of the men free from work. I have adopted this system, and have had now about 18 months experience of it, and can testify to the great improvement it is to the men. Men who formerly were careworn and sallen, now have a cheerful and healthy appearance. The expense, no doubt, is greater, but not so much as at first sight appears, at least, I found that when I introduced the system, my men did not expect to get the same amount of money for the eight hours as they had for the 12 hours. They yielded a part; the consequence is, that the men get about 10 per cent. less money than they had previously.

But this question of pay, or of working the men to an unreasonable and unjust extent, that the gas, to the consumers, may be a halfpenny or three farthings per 1000 cubic feet cheaper, is, as I see it, a bad argument. No consumer of gas is entitled to get his light a fraction cheaper than what it can be legitimately produced for. Can any one say that it is legitimately produced if the men making it work 84 hours each week. I think not. Moreover, I believe that, were the gas consumers required to give their voice on this matter, 99 out of every 100 would gladly pay the difference. Consumers of gas are quite aware that gas cannot be produced at so low a price as formerly, nor is gas likely to be so cheap as it was a year or two ago, for a very long time to come; or if it is as low in price, the illuminating power of the gas will require to be much reduced; indeed, my opinion is that the gas consumers of Scotland must make up their minds to be satisfied with gas much inferior in quality to that which they have hitherto enjoyed. Why we Scotchmen should desire and get so much richer gas than our English friends, is more than I can see.

In the midst of all your cares and anxieties during the past year, it must have been gratifying to you to hear of so many new schemes for making cheap gas. It is not my province nor desire here to enter into a minute detail of all the modern patents for producing cheap gas. I may be permitted, however, to say that one thing has particularly impressed me in relation to some of such schemes—that is, the enormous sums the inventors get,

or are represented to get, in the prospectuses issued. I would suggest that all such sums should be conditional on the results realized. Were this so, I rather think we would see fewer of such—shall I say—absurdities in future. I think it is our duty to aid, in every way possible, all those who devote their time, talent, and energy in endeavouring to make such discoveries as shall tend to the public good. We should not be too hasty, certainly, in adopting all or any new scheme, but, on the other hand, it is very wrong to attempt to crush an invention or discovery by pooh-poohing it before the inventor has had sufficient opportunity to fully prove his purpose. On the other hand, I believe very good and useful inventions are crushed out, so far as practical purposes go, by speculators who seize on what they suppose will *float* in such favourable times, and in a week or two the shares will be at a premium of no ordinary dimension. This, I say, tends to sink into oblivion that which, in the absence of such financing, might turn out really to be of some importance.

I am not aware that it is necessary to refer to any of the many inventions for improvements in apparatus relating to gas-works during the past year. Improvements in gas-meters, scrubbers, joints of pipes, &c., are very numerous, and not having had an opportunity to prove their merits, I am unable to say anything about them. I have no doubt, however, that you will all be ready to adopt them when you see that your purposes are to be better served thereby.

I cannot sit down without referring to the loss this as well as all kindred associations, and also all concerned in gas undertakings, have been subjected to since we last met, by the death of Mr. Thomas G. Barlow, who for upwards of half a century took a very great and practical interest in gas lighting, and who, in 1849, established the JOURNAL OF GAS LIGHTING, a work that perhaps has done more in fostering the growth of gas establishments, in exposing errors, and stamping out impostors, on gas matters, than all other agencies put together. This JOURNAL was edited by Mr. Barlow, and in that work he displayed a genuineness and intelligence not often met with.

Our departed father and friend was accessible by every one who desired his aid in gas matters. It did not matter whether it was a board of directors, a Provost and Town Council, a gas engineer, manager, gas-fitter, or stoker, he was to all alike courteous, and ever ready to aid with his enlightened judgment and his large experience. Personally, I had frequent opportunities of witnessing his conduct in a very important gas case. It did one's heart good to see with what earnestness he went into the smallest matter, and with what ease he grasped the most momentous and important. The country, so far as gas lighting is concerned, has lost a strong prop. May his life, talents, and energy be a stimulus to us all, not only to gain possession of the knowledge and experience possessed by the deceased, but to use them, when acquired, in the same kind and unostentatious manner.

Gentlemen, I need not take up more of your valuable time; I might have touched upon many other important matters connected with our profession, but I need not. You will, I am happy to know, have an opportunity of hearing some very valuable papers read, and the discussion thereon, by our southern friends. I suppose you have calculated on that, and determined that the time of the Scotch society should not be taken up by papers by any of yourselves.

Mr. J. WHITE (Lanark) read the following paper:—

AN EASY AND EFFICIENT MODE OF JOINTING SPIGOT AND FAUCET ASCENSION PIPES, ETC.

The subject of this paper is one of some importance in its practical bearings, although it is with considerable diffidence that I venture to lay my views on the question before the members of this association. To many of those present, it is, perhaps, a matter of comparative indifference how or what kind of joints are made, provided they are not an eyesore by allowing the tar to ooze out and run down the pipes or over the mouthpiece, because in many gas-works there are always men about the works to attend to and see after these things. To those of us, however, who have not only the works to manage, but also to perform the manual labour required, the knowledge of an easy and at the same time efficient method of fitting up the ascension-pipes, &c., must be of some importance. Every one knows the difficulty that attends the picking out of a well-made joint of fire-clay and rust, or even of cement, such as is generally used for the class of pipes here referred to. So great, indeed, was that difficulty in the beginning of my management, on a short winter day, and nothing but the hourly prospect of a short supply to the consumers staring me in the face, that I resolved instead of rust, just to try a joint of ordinary ground dry fire-clay. I may mention that owing to the heat of the mouthpiece when at work I make up a little clay pretty stiff with water and fill into the bottom of faucet to about three-quarters of an inch depth. Any others I give merely as much yarn as keeps the clay out of the pipe, then fill up with the dry clay, beating it firmly together with an ordinary caulking iron, and sometimes damping the face of it if wishing to give a smooth finish. By this means a very serviceable joint is easily made, and it possesses an undoubted advantage, inasmuch as it is easily undone when required, as by merely getting the joint to yield a little, the clay will trickle down as if it was dry sand. In this way there is a great saving of time, which is money in another form, besides the breakage of irons, &c. So satisfied have I been with this kind of joints that I have used nothing else for a period of seven years now, and during the whole of that time I have never been annoyed with a leaking joint, unless through pure carelessness on the part of the workman who made it. I am well aware that there exists a strong prejudice in the minds of some against a joint of this kind, and I remember on one occasion I had in my employment a very good workman, with upwards of 20 years experience in a medium-sized gas-works, who tried to persuade me it was downright folly to trust a joint of this kind, on the ground that the pressure of gas would blow all before it. This man, having got the retort in proper working order and fully charged with coal, went Jonah-like and sat down to see what the result might be, but found to his sad dismay that a joint thus carefully made will stand any amount of pressure. I hope you will forgive me for occupying so much of your time, and will only add that, should any member of this association think of giving my plan of fitting up these pipes a fair trial, I have every confidence he will not be disappointed, and I shall feel that my present remarks have not been made in vain.

The PRESIDENT stated that he had made use of this mode of jointing for a considerable time past, and could bear testimony to its efficiency. Joints so made were not only expeditiously done, but were perfectly gas-tight. He employed it exclusively in jointing the covers of condenser-pipes, and found it to suit well.

Mr. WHIMSTER (Perth) asked the president if in the latter instance—viz., the condenser covers—he used the clay in the dry state.

The PRESIDENT stated that for this purpose the clay was slightly moistened.

Mr. ROBB (Haddington) stated that he also had used fire-clay as now indicated for jointing, and had found it to suit very well. He could recommend it, to those who had not tried it, as an economical and useful method. He begged to propose a vote of thanks to Mr. White, which the meeting accorded unanimously.

Mr. MURRAY (Coldstream) read the following paper:—

ON AN IMPROVED METHOD OF RETORT-SETTINGS SPECIALLY ADAPTED FOR SMALL GAS-WORKS.

In submitting the models and drawings to the members of this association, I would beg leave to observe that I am well aware that the plan adopted by me in setting my retorts would not be suitable for large works, where room is valuable, as retorts set on the plan shown in these models can only be set in one line. The class of works for which the plan is best adapted is small works, of which there are a great number throughout the country, where the consumption does not exceed 40,000 cubic feet per day.

As some difficulty has been found in getting men, such as are generally employed at small works, to understand the principle upon which the retorts are set from the plan alone, I resolved to overcome the difficulty by having these models constructed so that any man accustomed to set retorts can, by careful inspection, readily understand the principle of the plan now submitted for your consideration, and may easily adapt it to any size or shape of retort with very little alteration in the fire-bench (unless otherwise necessary). The plan has several merits, which I trust will be obvious on an inspection, but I would specially call attention to the following:—

1. The retort is set so that no amount of heat can bring any part of it down, the furnace door being placed outside the arch, so that a centre wall may run nearly from end to end of the retort.

2. Retorts set on this plan will last a season longer than those set in the usual way.

3. The flues are constructed so that the flames traverse the entire length of the retort twice before passing into the main flue, thus keeping up a uniform heat.

4. In works where the damper requires to be shut, the heat is retained for a greater length of time, and is easily brought up in the morning; and

5. In small works where furnace coal is often a great expense, the plan will be found to be of great value, the coke and tar being almost sufficient to keep up the heat, however small the consumption.

I may mention that at present I am only requiring two charges of one retort per day, and I find the coke and tar I am making daily sufficient to keep up the requisite heat.

In conclusion, I beg to mention that I have had this plan in operation in the works under my charge for about eight years, and the advantages of the plan have been fully tested from practical experience, and I have no hesitation in saying that this is the best plan of setting retorts in the class of works for which the models are intended, that has ever been adopted, so far as I have ever seen or tried.

The models referred to in this paper were afterwards inspected by the members, and the system of setting and working explained by the author. Thereafter the president proposed that the meeting award its best thanks to Mr. Murray for his paper, and for the great amount of labour bestowed by him on the models now submitted.

Mr. ROBB (Haddington), in seconding the proposal, stated that he had inspected this method of setting in operation, and could bear testimony to the high and uniform heat maintained on the retorts. He was satisfied that the plan now submitted was well adapted for small gas-works.

The meeting unanimously accorded its thanks to Mr. Murray.

GLASGOW WATER COMMITTEE.

A Special Meeting of the Water Committee was held on the 23rd ult.—Mr. JAMES BROWN in the chair.

The TREASURER (Mr. Guthrie) read the annual report as follows:—

The Water Committee beg to submit to the commissioners the annual abstract statement and balance-sheet for the year ending May 28, 1873.

Finance.—The rates levied during the past year were as follows, viz.:—The domestic water-rate within the municipality of the city of Glasgow, being the limits of compulsory supply, at 8d. in the pound; the public water-rate within said limits, at 1d. in the pound; the domestic water-rate beyond the limits of compulsory supply, at 11d. in the pound; and the rates and charges for supplies for manufacturing, trade, or business purposes, according to a table revised and approved of on May 20, 1872, and duly published. The "Glasgow Water Account" was, as usual, brought to a balance on the 28th of May last, and having been audited by Mr. William Anderson, C.A., the auditor appointed in terms of the Glasgow Corporation Water-Works Amendment Act, 1859, it was thereafter submitted to your committee, and examined and authenticated on 16th current, and instructions given for an abstract to be printed and circulated, in terms of the statute. The revenue collected during the year amounted to £111,302 0s. 3d.; surplus on the account for the year 1871-72, £5023 9s. 8d. The expenditure, including annuities and interest on mortgage debt, has been £98,099 5s. 4d; balance, carried to sinking-fund account, £18,226 4s. 7d. The revenue for last year was £111,302 0s. 3d.; ditto for previous year, £119,780 11s. 2d.—increase, £521 9s. 1d. The reduction of 1d. per pound on the domestic water-rate beyond the compulsory limits, and of the meter-rate to a uniform charge of £2 per 100,000 gallons, diminished the revenue upwards of £5500. The expenditure for last year, exclusive of sum carried to sinking-fund, was £98,099 5s. 4d.; ditto for previous year, exclusive of sum carried to sinking-fund, £97,262 8s. 5d.—increase, £836 16s. 11d. The present rate of workmen's wages, and the high price of materials, will readily account for this increase. The sum of £18,226 4s. 7d., which has been placed to the credit of "sinking-fund account," now raises the sum total to £41,226 4s. 7d.

Your committee have resolved to continue, for the year commencing the 28th of May last, the domestic and public water-rates of the previous year. The commissioners resolved last year to apply to Parliament for an extension of the time fixed by the Act of 1866 for the removal of the dam or weir across the river Clyde above the Hutchesontown Bridge, and the lock and other works connected therewith, and for supplying the owners and occupiers of manufactories and other works. A bill was accordingly prepared for that purpose, and also for the prevention of waste and misuse of the water supplied. The bill has since been successfully carried through Parliament, the Royal Assent having been given on the 26th of May last. All the works are in a satisfactory condition, and few repairs will be required this summer. Arrangements are in progress with the Duke of Montrose and other proprietors along the Kelty section of the aqueduct for the forming of a road parallel with the line of works, so as to obtain more ready access in the event of accidents. This district is at present very insufficiently provided with roads, and great inconvenience and loss of time are sometimes experienced in consequence. The laying of the two lines of 36-inch mains between Canniesburn and the Mugdoc reservoir is nearly completed, and it is expected that one of them will be filled and tested in a fortnight from this date, preparatory to its being brought into use. The works in connexion with the repair of the embankment of the Waulkmill Glen reservoir at the Gorbals works are completed, but they were not finished in time to get the reservoir filled to the top last winter. This will be done during the ensuing winter. A new 15-inch main has been laid in London Road and Fielden Street for the better supply of that district. The extensions of piping during the past year have been as follows:—On north side—mains, 2837 lineal yards; distributing-pipes, 7540—10,427; on south side—mains, 1124; distributing-pipes, 3642—4766; total, 15,193 lineal yards, or 8·63 miles. The old pipes lifted and replaced during the year, were—on north side, 4118 lineal yards; on south side, 2193; total, 6311 lineal yards, or 3·58 miles. The average quantity of water sent into the city and suburbs during the past year was as follows:—

	Gallons per Day.
From Loch Katrine	27,725,140
„ Gorbals works	4,006,163
Together	31,731,303
Average for 1871-72	31,975,579
Decrease per day	244,276

Notwithstanding this decrease, the consumption per head is still 50 gallons a day, and your committee would urge on all consumers the necessity of co-operating with them in the suppression of waste.

Mr. THOMSON remarked that it was very satisfactory to find that during last year the consumption had been less than in the previous year, while the income had been greater.

In reply to a question from Mr. SCOTT,

Mr. GALE stated that the consumption in Manchester, where the supply was constant, was 23 gallons per head; in Liverpool, with an intermittent supply, 30 gallons; and in London, 36 gallons.

Mr. SCOTT said that, from the statement that the consumption of water was less and the revenue greater than last year, he was afraid the public might imagine that their affairs were going on more satisfactorily than they actually were. But it was evident the consumption was still 50 gallons per head per

day, while in other large cities they used 24 and 30, and in the highest (London) 36. He considered it very important that the public of Glasgow should know that they were consuming nearly double the quantity of water per head that was being done in any other city; and if they did not want the rate largely increased, they would require to use every possible means to diminish the waste that was going on.

The CHAIRMAN quite concurred in the remarks of Mr. Scott.

Bailie M'LELLAN observed that their Act required that a certain standard of water-fittings should be placed in all new houses. He did not believe that that was attended to, and he was of opinion that the greater portion of the waste was due to the insufficiency of the water-fittings.

Mr. OSBORNE said he was very credibly informed that the fittings presently being put into houses in course of erection were quite unsuited to stand the pressure of Loch Katrine water. He thought it would be necessary for the committee to consider whether stricter surveillance should not be kept in regard to that matter.

The report of the committee was then adopted.

EXETER WATER COMPANY.

The Annual Meeting of the Shareholders was held on Monday, June 23—R. SANDERS, Esq., presiding—when the following report was submitted:—

Your committee announced in their last report that two main portions of the works recommended by Messrs. Dymond for the better supply of the city were then approaching completion—viz. (1), the conduit by which the water was to be drawn from the Exe, at a point above its junction with the Culm, and (2) the rearrangement of the pipes at Heavitree and Mount Radford, so as to extend as far as possible the area supplied by simple gravitation from the present reservoirs. Both these important works have been satisfactorily completed. For some months past all the water delivered to the company's customers has been taken from a point in the Exe, where it is safe from any risk of contamination by the manufacturers on the Culm, and where it has been declared, on the high and independent authority of Dr. Frankland, to be above the average purity of water delivered to the best supplied towns in this country. The new main to Heavitree and Mount Radford has had the intended effect of reducing the extent of the high service area—*i.e.*, the area which could not be commanded by gravitation from the reservoirs—and thereby relieved the pumps at Pynes of a portion of the work they formerly had to perform. The surplus power thus saved is now available for raising an increased quantity of water to the reservoirs. The last and most important of the works recommended in Mr. Dymond's report is now engaging the attention of your committee—viz., the construction of a high-level reservoir, which shall command the whole of the high-service district, and entirely supersede the present unsatisfactory system of pumping directly from Pynes or from the steam-engine at the reservoirs into the cisterns of your high-level customers.

Your committee have been fortunate in securing an acre and a half of land at Marypole Head, and excavations are now in progress there for a reservoir capable of holding upwards of a million gallons; and it is the intention of your committee to complete the construction of this reservoir forthwith. There will then remain to be provided a duplicate steam-engine at the present reservoirs, but considering the unsettled state of the iron and labour markets and the heavy outlay necessary for the completion of the foregoing works, your committee may deem it prudent to defer this for the present.

Your committee, however, being of opinion that it would not be fair to throw the whole of the expenditure on the income to the serious diminution of the usual dividend, and yet being desirous of carrying out the recommendation of Messrs. Dymond, have acted on the principle of distributing a portion of the expenditure over the next few years; and anticipating with confidence the maintenance of the present rental, they believe that they shall be able to discharge within a very reasonable period any temporary debt that may be incurred, and yet maintain the usual dividend.

Your committee, with a most earnest desire to give an ample and efficient supply of water, have for some months past given an additional supply on Thursdays, a day hitherto reserved for flushing and repairs, and they intend to continue the same whenever practicable. By so doing the city will have what may be termed a daily supply on an average of five hours to each consumer. Since your last meeting your committee have set on foot a systematic examination of the private service works in selected districts of the city. This investigation has shown the existence of defects in the fittings in one out of seven premises examined, and the consequent waste of at least one-third of the quantity of water delivered.

Your committee cannot too earnestly press on the consideration of the consumers the importance of using proper precautions to remedy these defects, unjust to the company as thereby causing unnecessary loss to them, and unjust to the consumers on a higher level in the immediate district, as it thereby often prevents their having a sufficient supply. The committee are enabled to state that the reservoirs, engines, and other parts of the works are in good and efficient working order. It is with considerable regret that your committee have to report the resignation of your superintendent, Mr. Mudge, an office that he has held for 30 years, and, having during that period discharged his duties with zeal, and shown that he has had the interest of the company at heart, your committee submit that on his retirement they should be authorized to present him with some gratuity as an acknowledgment thereof.

Your committee, in conclusion, recommend that for the half year ending Midsummer instant a dividend be paid at the rate of £6 per cent. per annum.

The CHAIRMAN moved the adoption of the report. He expressed satisfaction at the completion of the work at Pynes, observing that now the company's customers had water, the purity of which was, according to the high testimony of Dr. Frankland, only surpassed in one city in England. He wished to advert to the waste of water by consumers. He did not say that it was generally wilful, for he did not believe that the public had any idea of what the waste was. He had put it down at one-third, and that was within the mark. People seemed to think that they could do what they liked with the water—waste it or not, just as they pleased, but he asked them to remember that every drop of water supplied to them cost the company something, and it was not fair to the company to permit this waste to continue. The finance question had to be considered in the prosecution of new works. The borrowing powers of the company had been exhausted; and the board had had to consider whether the new works should be thrown over a series of years, or whether they should take a bold step and run a little into debt, in order to complete the works at once. The board had resolved on the latter course, seeing that their present rental gave them a considerable surplus. He was hopeful that in a short time the whole debt would be cleared off from this source; and the time would then come for the shareholders to determine whether that surplus should then be applied to the increase of dividend or the decrease of rates. At present he might say that "sufficient unto the day is the evil (or good) thereof," but he hoped if that day did arrive that they would not raise the dividend too much. Water companies did not stand in the same position as gas and other companies, where the material had to be manufactured. They did not know whether a substitute might not be found for gas, but no substitute could ever be found for water. All that a water company had to do was to distribute the raw material; and they should therefore confine themselves to a moderate dividend, and thus keep out all competition. In conclusion, he spoke in high terms of Mr. Mudge, and his regret at his retirement after thirty years of faithful and zealous services. He trusted the recommendation of the committee as to the gratuity would be adopted, especially as ill health was the principal cause of Mr. Mudge's retirement.

Mr. DRAKE seconded the motion for the adoption of the report, and it was carried unanimously.

Mr. JOHN HUXHAM was re-elected secretary for the year ensuing; the board of management was also re-elected.

The thanks of the meeting were voted to the chairman and the board of management; and the chairman having responded, the proceedings terminated.

WEST OF SCOTLAND GAS MANAGERS ASSOCIATION.—We hope to find room for the report of the annual meeting of this association in our next.

ABERDEEN—GAS TESTING.—Professor Brazier, incumbent of the chemistry chair in Aberdeen University, has been appointed by the Gas Committee of the Town Council to test the quality of the gas supplied by them.

STOCKTON (CORPORATION) GAS SUPPLY.—At the monthly meeting of the council on the 30th ult., it was determined, on the recommendation of the Gas Committee, to put in force the provisions of the Stockton Gas Act, 1873, by raising a sum of money not exceeding £10,000 for the purposes of the gas-works.

DAMAGING A GAS-PIPE.—At the Warrington Borough Court, on Friday, the 4th of July, John Walsh was summoned, at the instance of the gas company, for damaging a pipe in Messrs. Rylands' yard to the extent of 15s. 5d. The defendent, who is in the employ of Messrs. Woods, grocers, backed his cart on a cellar opening, and broke a gas-pipe. The bench considered the case proved, and ordered him to pay 10s. damages, and costs.

ADVANCES IN THE PRICE OF GAS.—The Keighley Local Board have resolved to raise the price of gas to private consumers from 4s. to 4s. 2d., and that £500 additional be charged against the general account for the public lamps. The Broughty Ferry Gas Commission are about to raise the price from 5s. 10d. to 6s. 8d. At Alyth the price has been raised from 7s. 6d. to 9s. 2d., and the discount to large consumers reduced from 7½ to 5 per cent. There has been an increase of 1s. per 1000 cubic feet at Boston.

NEWCASTLE-ON-TYNE GAS SUPPLY.—At the Town Council meeting, on Wednesday, July 2, Alderman Harle moved—"That a select committee be appointed to negotiate with the directors of the gas company for the purchase of the works of the company by the corporation, and report to the council." Mr. Cowen seconded the motion, and Alderman Gregson (who did not think the corporation would find gas-making so profitable as they expected) and others supported it. The motion was opposed by Mr. Hamond, but the word "confer" having been substituted for "negotiate," was carried, and a committee appointed for the purpose.

SUFFOCATION WITH GAS AT LEAMINGTON.—On Saturday, July 5, a young woman, named Williams, who had been in the service of Mr. Mason, at Lillington, as cook and housekeeper, died from the effects of inhaling gas, which had escaped into her bed-room. As she did not come down on Friday morning, Mr. Mason broke open the bed-room door, and found her lying upon the floor in an unconscious state. Two medical gentlemen were sent for, and attended her until Saturday afternoon, when she died. She never recovered consciousness. The escape of gas is attributed to some alterations which had been made in the pipes on Thursday.

BREECHIN GAS COMPANY.—The annual meeting of shareholders was held on Monday, July 7—Wm. Duncan in the chair. The reports of the directors and manager on the affairs of the company, also the usual balance-sheet, were unanimously approved; and, as recommended in the directors report, a dividend of 10 per cent., with a bonus of 1 per cent., was declared payable on 1st proximo. An increase in the price of gas, the chairman stated, would in all probability be necessary, owing to the high price of coals, but it was agreed to delay fixing the extent of the increase until it should be seen at what price coals were to be had for the ensuing year.

SHEERNESS PUBLIC LIGHTING.—The Board of Health for the Sheerness district have decided on lighting the public lamps on the "average meter indication" system. The Sheppy Gas Company, acting under the advice of the late T. G. Barlow, Esq., proposed this system of lighting several years ago, but it was then declined by the board. The company now ask an increase of 12s. per light per annum, if the ordinary method of contracting were adopted, or the alternative of a supply by average meters fixed to one light in every ten, as prescribed by their Act. For years past the question of the price for lighting the public lamps has been an annual cause of controversy, which it is hoped will now be obviated. The board will be supplied at 4s. 6d. per 1000 feet, the present price to ordinary consumers.

SUICIDE OF A GAS MANAGER.—On the 4th inst., Mr. Edward Chatwood, aged 56, manager of the Ramsbottom Gas Company, committed suicide by hanging himself. He resided near to the works of the company at Stubbins. At about half-past eleven o'clock in the forenoon he was seen alive by Mr. Samuel Preston, the cashier, and at twenty-five minutes past twelve Mr. Chatwood, jun., had occasion to go into the board-room, when he was horrified to find his father suspended by a rope from a spar in that portion of the premises. He at once gave an alarm, and the body was cut down, and Dr. Smith was sent for. That gentleman found life to be extinct, the bone of the neck being broken. The deceased gentleman, who leaves a widow and family, has not, we understand, lately enjoyed good health, and has been in a rather low state of mind. He was much respected in the neighbourhood.

SERIOUS EXPLOSION OF GAS AT HALIFAX.—About half-past ten on Tuesday night last an explosion of gas took place in an empty house in Colbeck Street, Halifax, by which the roof was blown off and part of the front thrown down, whilst considerable damage was done to the adjoining property. For the last three months the house has been untenanted, and a few days ago was taken by a Mr. Robinson, who had it thoroughly cleaned in readiness for his removal to it. On Tuesday night Mr. Robinson and his brother were entering the house, having with them a lighted candle when the explosion took place. Both, however, fortunately escaped unhurt. A man residing next door had a very narrow escape. He was going down the steps leading to his kitchen at the moment the explosion took place, and had but just time to jump aside to prevent a large quantity of stones and rubbish falling upon him. The gas was immediately turned off by a servant of the corporation, the explosion having been caused from a considerable leakage in the pipes in the house.

BOSTON GAS COMPANY.—The annual meeting of this company was held on the 10th inst., when the following report from the directors was adopted:—"The directors have pleasure in laying before the shareholders a balance-sheet for the year ending June 30, 1873, which shows the business of the company to be in a sound and prosperous condition, the net profit on the year's work being £3092 13s. 11d., showing a decrease of £125 8s. as compared with the preceding year, owing to the considerably increased cost of materials and labour affecting the cost of production. The directors recommend the payment of the full parliamentary dividend on both classes of shares, clear of income-tax—viz., 8½ per cent. on the old shares and 7 per cent. on the new, out of the profits of the year. Under the still existing and unprecedented state of circumstances in the coal and labour markets, the directors have been at length compelled to increase the net price of gas 1s. per 1000 feet, the present price of coal being 9s. 3d. per ton more than was contracted for last year, and more than double the price paid the year previous. They recommend that the sum of £500, appropriated as a reserve-fund, be transferred to the general account towards the expenses of the new top to gasholder No. 2, and other renewals. The directors beg to inform the shareholders that the consumption of gas has been affected by the early closing of shops and public-houses."

YORK GAS SUPPLY.—The monthly meeting of the corporation of this city was held on Monday, the 7th inst.—the Lord Mayor presiding. At the previous monthly meeting it was reported that the directors of the gas company had decided that, owing to the great increase in the price of coal and other items in gas manufacture, they were reluctantly compelled to advance the price of gas to 3s. 4d. per 1000 cubic feet. The annual charge for public lamps would therefore be increased from the 1st of July to £2 19s. each, the charge then being £2 10s. 6d. per lamp. The Urban Sanitary Committee resolved that the town-clerk be directed to call the attention of the gas company to the clause in the agreement between the company and the corporation, whereby six months notice is required to determine the same, and to inform the company that the committee were advised the charge for the public lamps could not be raised until such agreement has been duly determined accordingly. On the

legal question the directors had taken the opinion of Mr. Manisty, Q.C., who advised them that the contract, being by deed under seal, or by a six months notice in writing under the terms of the contract, the reductions made in the price were voluntary concessions on the part of the gas company, and that they did not constitute a new contract or an abandonment of the old one, and further, that the company could withdraw their existing concession, and insist upon payment of the contract price from the time of withdrawal. The town-clerk had since taken the opinion of counsel—viz., Mr. Speed and Mr. Cave—and the result was now reported to the corporation. That opinion was in favour of the position taken by the gas company, and the committee recommended the council to agree to the increased charge. The report was adopted. The Parliamentary Committee reported that they had had under consideration the Government Municipal Corporations (Borough Funds) Bill, for the purpose of amending the Act of last session. The bill did not meet all the objections discussed on that occasion, but repealed two of the most objectionable provisions of the existing Act—viz., the proviso that nothing therein contained should authorize any governing body to promote any bill in Parliament for the establishment of any gas or water works to compete with any existing gas or water company established under any Act of Parliament, and the proviso that no expense in promoting or opposing any bill in Parliament should be allowed, unless such promotion or opposition should have had the consent of the owners and ratepayers of the district. The committee recommended the council to petition Parliament in favour of the bill, and a petition was adopted accordingly.

Reading Public Lighting.—At a meeting of the Reading Town Council, on the 4th inst., the deputy town-clerk read the following report from the sub-committee appointed on the 13th ult., in reference to the arrangements for lighting the public lamps of the borough:—"The sub-committee beg to report that on the 17th of June they met a deputation from the Reading Gas Company, who submitted and explained to the sub-committee the data upon which the company had made their offer to supply with gas, and to light, extinguish, clean, and repair the public lamps for one year, from the 30th of June, at the rate of £2 12s. 6d. per lamp per annum. After fully considering the whole matter, the sub-committee deemed it desirable that arrangements should be made with the company for a longer period than one year, and accordingly proposed that a new contract should be entered into with the company for lighting the public lamps for a period of three years, at £2 12s. per lamp per annum, but this proposal was declined by the company. The sub-committee therefore recommend the committee to accept the offer made by the company to supply with gas, and to light, extinguish, clean, and repair the public lamps for a period of 12 months, from the 30th of June inst., at the rate of £2 12s. 6d. per lamp per annum, upon the conditions of the contract between the local board and the gas company, dated the 1st of January, 1868, with this modification—viz., that lighting of the lamps shall be commenced on each evening during the year a quarter of an hour earlier than the respective times for commencing lighting stated in the table set forth in the said contract." The committee having considered the matter, it was resolved unanimously—"That the proceedings and recommendation of the sub-committee, as now reported, be approved, adopted, and confirmed."

Portable Gas Apparatus.—To make one cubic foot of hydrogen gas there will be required:

Oil of vitriol	0·26 lb.
Zinc	0·17 ,,
Or if iron be substituted for zinc,	
Iron	0·15 ,,

The cost of hydrogen by this process will be per cubic foot:

From Zinc.

Oil of vitriol, 0·26 lb., at 2½ cents.	0·65 cent.
Zinc, 0·17 lb., at 8 cents.	1·36 ,,
	2·01 cents.

From Iron.

Oil of vitriol, 0·26 lb., at 2½ cents.	0·65 cent.
Iron (wrought scrap), 0·15 lb., at 2 cents.	0·30 ,,
	0·95 cent.

Petroleum oil will not answer for carburetting this hydrogen, though if of a poor quality—that is, contains naphtha, &c.—it will yield up those latter impurities, and thus carburet a small volume of gas. Gasoline and benzole are the best carburetting liquids. Compared with ordinary coal gas, however, there is a great economy in the use of the latter. The highest price charged for coal gas is 4 dols. per 1000 cubic feet, which would be 0·4 cent per cubic foot against 2·01 cents, or 0·95 cent for the hydrogen, to which must be added the cost of the carburetting material, as, of course, the hydrogen has no luminosity; so that the person who proposes to furnish a 6-feet-per-hour gas light, equal to ordinary coal gas, for 0·84 cent per hour, is convicted of ignorant or fraudulent pretensions. If the carburetting material cost nothing, such a light could not be afforded for less than 5·7 cents. City gas-works, which they claim to rival in economy, even at the high price of 4 dols. per 1000 cubic feet, would furnish the same light for 2·4 cents.—*American Chemist.*

Birmingham Water Supply.—Dr. Hill, the medical officer of health for Birmingham, reports that the water supplied to that town during the month of June, although slightly turbid, showed a decrease in the proportion of organic nitrogen.

Glasgow Water Supply.—Professor Bischof, of the Andersonian University, Glasgow, reports that the water supply of that city during the month of June was "quite free from any evidence of previous sewage or animal contamination."

New Water Tunnel at Chicago.—Our readers will remember that the city of Chicago is supplied with fresh water by means of a tunnel, built under the bottom of Lake Michigan, and extending out under the lake, two miles from the shore, to a crib where the water is let in and flows to the shore, being then pumped and distributed through the city. Its capacity is only 54,000,000 gallons a day, a quantity insufficient for the rapidly growing demands of Chicago. Contracts for another tunnel have been accordingly made, and this new work is now in process of construction. The new tunnel will be 7 feet in diameter and six miles long, of which two miles will be under the lake and four miles under the city. A correspondent of the *New York Times* says that "the labourers on the shore end have progressed some 2000 feet out under the lake, while from the crib end another body of men are working steadily forward to meet them. The limited diameter of the bore renders it impossible for many to work at once, but they are at it night and day, averaging at each end a progress of perhaps 12 feet in 24 hours. The masons keep as close behind the diggers as possible. The soil penetrated is a hard blue clay, and such a thing as a caving in has not happened so far. A tin tube, 8 inches in diameter, is constantly advanced with the workmen, thus furnishing a circulation which prevents the accumulation of foul air. It is hung in the top of the tunnel, and, when necessary, is worked with a fan at the outer end. This new tunnel runs parallel with the old one, distant from it about 50 feet. It enters the same crib, and strikes the shore at the same water-works, but will deliver its supply at the new works, at the corner of Ashland and Blue Island avenues, three and five-sixths miles from the old ones; and to reach it the new tunnel is to be extended under the city, river, large business houses and all. It is estimated that the cost will be somewhere in the neighbourhood of 1,000,000 dols. From the tunnel there are to be nine or more shafts reaching to the surface of the ground for fire purposes. The water, of course, will rise in them to the level of the lake, and, should the pumping works give out, will be easily accessible to the engines. This land tunnel, as well as its lake connexion, is to have a vertical diameter in the clear of 7 feet and 2 inches, and a horizontal diameter of 7 feet. Its capacity will be over 100 million gallons per day. It will be lined with heavy masonry, a foot thick, and of the best materials. Jan. 1, 1875, is specified as the date of its completion.—*Scientific American.*

Death of Mr. Edward Pittman.—The Nictheroy Gas Company have had notice of the death of their manager, Mr. Edward Pittman, after a three days illness, from yellow fever. Mr. Pittman was for about 25 years connected with the British Gaslight Company. He left West Bromwich, having been manager of the gas-works there for several years, and went to Nictheroy as manager for that company, and has scarcely held the appointment twelve months. Mr. Pittman was well known to, and respected by a large number of gentlemen connected with gas-works, who will read this notice with regret.

Precautions Against Cholera.—A circular just issued by Mr. John Simon, the medical officer of the Local Government Board, contains the following paragraph:—"In view of any possibility that the infection of cholera may again be present in this country, it is desirable that in each locality the public should ascertain to whom it practically was to look, in case of need, for its collective safety against such dangers as the above. The responsibility is, in a large proportion of cases, mixed. The most critical of all its branches—the responsibility of providing for the unpollutedness of water supplies—is, in many very important places, in the hands of commercial companies, and it is to be hoped that those companies, informed, as they must be, of the calamitous influence which some of their number have exerted in previous epidemics of cholera, will remember, if the disease shall again be present here, that each of them in its daily distribution of water, has hundreds, or even thousands, of human lives in its hands. But, except to that extent, the responsibility for local defences against cholera, both as regards water supply and as regards local cleanliness and refuse removal, is vested in the local sanitary authorities, urban and rural."

Register of New Patents.

3033.—Pontifex, E. A., and Barton, J., Shoe Lane, London, "*Improvements in water-waste preventers.*" Patent dated Oct. 15, 1872.

This invention has for its object improvements in apparatus whereby waste of water is prevented, and if desired the quantity drawn off may be measured, and consists of a box or chamber provided with inlet and outlet pipes connected to it, at apertures in the top and bottom respectively. Each of these apertures is fitted with ordinary flat valves closing with the flow of the water. Between these two valves the box or chamber communicates with a closed measuring vessel. At the centre of the box or chamber is pivoted a rocking lever, the pivot being carried through the side of the box or chamber, and provided with a handle or suitable connexion on the outside, by which the lever may be rocked to and fro. When the lever is left free, one end of it is caused by means of a weight to bear against the spindle of the inlet valve and so to lift it from its seat, and when the lever is caused to rock it first allows the inlet valve to fall to its seat, and then its other end comes against a stop on the spindle of the valve on the outlet-pipe and raises it.

When the outlet-valve is closed, and the inlet-valve open, the water flows from the elevated cistern or main into the measuring vessel, compressing the air therein. When to draw off water the weighted rocking lever is moved by its handle or connexion it no longer supports the inlet-valve, which closes, and then the other end of the lever acts against the stop on the outlet-valve and thereby lifts this valve, and the water is forced out through the outlet-pipe by the pressure of the air in the air vessel. If the pressure of water in the inlet-pipe is constant, it will readily be seen that the quantity of water drawn off by each oscillation of the lever is also constant, and if an indicator be attached to the handle the apparatus may be used as a meter.

In place of using a closed measuring vessel a small air-pipe may be led up from it to a point above the level of the water in the supply cistern.

3038.—Underhay, F. G., Clerkenwell, for "*Improvements in water-waste preventers.*" Patent dated Oct. 15, 1872.

This invention has for its object improvements in water-waste preventers. In order to supply to a closet or other place a measured quantity of water fixed inside a cistern is a measuring-box with a hole in the top for the water to enter it, and another hole in the bottom to deliver the measured quantity of water into a pipe passing out through the bottom of the cistern, and connected with the pipe leading to a closet or other vessel. Each of the holes in the box is fitted with a valve weighted sufficiently to cause it to descend on to its seat whenever it is left free to do so. Within the measuring-box is a lever mounted on a fulcrum intermediate of its length. The two ends of this lever pass through slots in stems formed on the valves. The lever is weighted at one end, and near the same end a wire is attached, which ascends a rising air-pipe fixed on the top of the measuring-box. The wire is there connected with the pull which is employed in drawing water. When the pull is not acted on, the weight upon the lever within the measuring-box lifts the inlet-valve, and the box fills with water. As soon as the pull is brought into action it lifts the weighted end of the lever, and the inlet-valve by its own weight falls down to its seat, and afterwards the further motion of the lever causes it to act on the delivery-valve, which it does as soon as the lever comes to the end of the slot in the valve-stem, and then this valve is lifted and the measured quantity of water is discharged. When the pull is released the outlet-valve first falls on to its seat, and then the weighted lever when nearly at the end of its stroke lifts the inlet valve.

In some cases, with a similar object, a small cistern divided by an upright partition into two compartments is employed. By a ball-cock water is supplied to one compartment, and it passes by a communication below the bottom of the cistern into the other compartment. The water ascends by an inlet hole in the bottom of this part of the cistern, which is also provided with an outlet hole connected by a pipe with the closet or other place where the measured supply is required. Both of these holes are closed by valves which are controlled by a weighted rocking lever worked with a pull, as already described.

3057.—Shedlock, J. J., Upper Holloway, "*Improvements in apparatus for the treatment of hydrocarbon gases and vapours for illuminating and heating purposes.*" Patent dated Oct. 16, 1872.

The object of this invention is the construction of apparatus for the treatment of hydrocarbon gases and vapours, whereby combinations of a permanent gas and atmospheric air, or hydrocarbon vapour and atmospheric air, or it may be a permanent gas, atmospheric air, and hydrocarbon vapour are formed, by the combustion of which light and heat are produced when one or other of the above combinations of a permanent gas, air, and hydrocarbon vapour is consumed at properly constructed burners. For these purposes an outer case is provided, charged to the required level with any suitable liquid, and fitted with inlet and outlet passages communicating from the exterior of the outer case with the interior of two or more vessels, carried by a shaft or shafts, and supported by bearings fixed in the interior of the outer case. The vessels are provided with inlet and outlet passages, through which the gas or atmospheric air in passing

is regulated, and a steady and equal flow of the gas or atmospheric air is maintained. A division is made in the case separating the vessels, but allowing a free passage for the liquid below its level. The capacity of these vessels is regulated so that the vessel through which a permanent gas is made to pass under pressure shall be of about one to five of that through which the atmospheric air is drawn, but the capacities may be varied to suit different gases or the purpose for which they are to be applied. The atmospheric air before being admitted to the vessels must be freed from any moisture or vapour of water which it may contain, for which purpose it may be treated by any known process, such, for instance, as passing it over or through sulphuric acid or lime. When a permanent gas cannot be obtained, then any suitable contrivance for actuating the vessels can be attached to the shaft or shafts, and atmospheric air will be drawn into and carried through the vessels to the outlet passages, whence it is forced into a chamber, in which a number of cylinders placed one in the other are securely attached to a plate, which forms the bottom of a reservoir containing a suitable hydrocarbon liquid. Holes are made in each cylinder alternating on either side of radiating vertical plates placed between each cylinder, and securely attached to the same plate as the cylinders. Pipes and cocks or valves regulate the passage of the atmospheric air through the whole or any number of the cylinders, whereby the complete or partial saturation of the atmospheric air with the hydrocarbon vapour will be effected. The smallest cylinder fitted with a series of perforated trays passes through the reservoir, and terminating in the upper part thereof is fitted with valves or cocks for the purpose of regulating the pressure of the gases or vapours passing off to the burners. A pipe, or pipes, reaching to nearly the bottom of the reservoir are attached to the upper part, the openings of which are protected from injury and made sound by means of a collar having an annular recess cut into its upper side, in which is placed a composition not affected by the hydrocarbon liquid. A cap provided with an annular projection corresponding with the recess in the collar is made to screw on to and form a joint perfectly sound with the collar. In some cases a cock or valve will answer the same purpose as the collar and cap, and can be fitted in lieu thereof. The reservoir is charged with the hydrocarbon liquid by means of these pipes, and the chamber containing the cylinders is supplied with the liquid from the reservoir by means of pipes and cocks or valves placed at the required levels. The spaces between the cylinders and the perforated trays are filled with a material having an absorbent capillary attraction for the hydrocarbon liquid, whereby the atmospheric air or gas in passing through the cylinders becomes impregnated with the vapours given off from the liquid. The mixture of permanent gas and atmospheric air may be carried direct for consumption to a burner or burners, hereafter described, or it may be made to pass through the chamber containing the cylinders and become impregnated with the hydrocarbon vapour, or the atmospheric air alone can be made by suitable bye-pass valves or cocks to pass through the chamber for its saturation with hydrocarbon vapour, and be made afterwards to combine with the permanent gas on its passage to the burners.

The mixed gas and atmospheric air can be consumed by any form of burner adapted for that purpose, but it is preferred to use a burner of the following construction when required to exhibit a powerful light and also throw out great heat:—The permanent gas and atmosperic air, or the air saturated with the hydrocarbon vapour, or the mixtures of gas, atmospheric air, and hydrocarbon vapour, are made to pass through perforated plates of any non-oxidizable material, and there ignited and surrounded by a cap or caps of gauze made from a metallic wire capable of bearing a high heat without becoming oxidized or corroded, and which will become highly luminous when heated to the necessary degree by the combustion of the mixed gases or vapours. For ordinary illuminating purposes any of the common forms of burners can be used, the best results being given by those which can consume the gases at a low pressure.

3058.—SHEDLOCK, J. F., Harrow Road, Paddington, "*An improved rymer and counter-bore or pin-drill.*" A communication. Patent dated Oct. 16, 1872.

The object of this invention is the construction of an adjustable rymer and counter-bore or pin-drill, for which purpose a shank or mandril is provided having wedge-shaped or conical projections, over which are fitted two blocks having corresponding recesses made on their inner sides. The angles on the blocks are made with cutting edges, and the ends of the blocks are provided with radial grooves which form cutters. A bolt fitted with a collar, and having a screw cut on its end, is made to fit a tapped hole in the end of the shank or mandril. A cross-head having two arms screwed and fitted with nuts is placed on the bolt, against the collar of which it takes a bearing. The two arms of the cross-head pass through holes made in the blocks, which are counter-sunk to allow the nuts to lie therein. A screw is made to pass through the blocks at the opposite end to that at which the cross-head is placed, and a slot is cut in the shank or mandril to allow this screw to pass when the blocks are adjusted on the shank or mandril.

The blocks are made to expand or contract on the shank or mandril by means of the bolt, which upon being turned will by its screwed end enter the shank or mandril, and drawing it in the direction of the collar force the wedge-shaped projections up the recesses in the blocks, and consequently expand the blocks. By the reverse action of the bolt the blocks ride down the wedge-shaped projections on the shank or mandril.

When the blocks are set at the required distances, the nuts on the arms of the cross-head and the screw passing through the blocks are screwed home, thereby jamming the shank or mandril between the blocks. That part of the bolt which projects beyond the blocks will form a guide-pin when the tool is used as a counter-bore or pin-drill. If it is required, the cutting edges of the blocks may be made serrated so as to answer the same purpose as a tap, or the cutting edges can be so formed that an under-cut hole can be made by the action of this tool.

3063.—RIGOLLOT, F., Paris, "*Improvements in sluice-valves for regulating and indicating the flow of fluids, parts of which improvements are applicable to cocks.*" Provisional protection only obtained. Dated Oct. 17, 1873.

This invention relates to a peculiar arrangement of rotatory sluice valve for gas, water, or steam pipes, the valve being opened and closed from the outside by a screw and a worm-wheel, which actuates a bevel pinion gearing into teeth in a rotatory diaphragm. An indicator serves to show on a quadrant the amount of opening of the valve. It is also proposed to apply a worm and worm-wheel or quadrant to the plugs of cocks for the purpose of rotating them, and to make the contact surfaces in both sluice valves and cocks consist only of projecting ribs or surfaces surrounding the opening for the passage of the liquid.

3108.—PEEBLES, J., Errol, N.B., "*A new apparatus for containing and supplying illuminating gas.*" Provisional protection only obtained. Dated Oct. 22, 1872.

This invention has for its object to constitute means for supplying gas to places or buildings at a distance from gas-works. It consists of one or more vessels, into which the gas is compressed, connected by a pipe to a gasholder of varying capacity, a cock or valve being situate in the pipe connecting the vessel or vessels with the gasholder. This cock or valve is connected by links and levers, or their equivalent, to the rising and falling member of the gasholder, so that as this member rises or falls the cock or valve is moved correspondingly, the area of its opening being thereby adjusted, and thus the quantity of gas passing from the high-pressure vessel or vessels into the gasholder is regulated. The gas, on passing into the gasholder, expands or diminishes by pressure to the extent required to burn effectively on escaping through an ordinary gas-burner or jet.

The vessel or vessels containing the highly compressed gas may be detachable from the remainder of the apparatus and of a portable size, so that they may be conveyed to a gas-work for being charged with gas when required, or larger vessels containing the gas under pressure may be mounted on wheels and moved about from place to place to supply the vessels attached to the apparatus when these are fixed.

3126.—BROWN, T., Newgate Street, "*Improvements in machinery for compressing air or gas, parts of which improvements are applicable to the pistons and piston-rods of steam-engines.*" (A communication.) Patent dated Oct. 23, 1872.

These improvements consist in constructing the pump cylinder with a jacket forming an annular chamber surrounding the cylinder, through which is maintained a circulation of cold water. The cylinder covers are made with chambers, through which cold water is caused to flow. The piston and piston-rod are also made hollow, and into the piston-rod a small tube, which is supplied with water from a reservoir or otherwise, is inserted. The cold water entering the small tube passes through it into and through the hollow piston. For making the joints or connexions air-tight under a high pressure, a rubber tube, through which is passed a length of soft rope, or other suitable material, is used. The ends are cut at an angle to overlap each other.

APPLICATIONS FOR LETTERS PATENT.

2235.—BOCSFIELD, G. T., Sutton, Surrey, "Improvements in lamps to be used for cooking, heating, and lighting purposes." A communication. June 27, 1873.
2245.—GRAHAM, D. A., Gas-Works, Stalybridge, "Improvements in the manufacture of gas and in the apparatus employed therein." June 28, 1873.
2247.—CARTER, J., and CARTER, J. E., both of Halifax, "Improvements in the manufacture of water or stench traps." June 28, 1873.
2249.—GARFORTH, W. E., Dukinfield, and WALKER, W., Newton Moor, "Improvements in steam-pumps for raising or forcing fluids." June 28, 1873.
2259.—HENDERSON, A. C., Southampton Buildings, Holborn, "Improvements in water, liquid, gas, and steam gauges." A communication. June 30, 1873.
2262.—SKOINES, H., Argyle Street, King's Cross, "The manufacture of charcoal, &c., from coke and other residues from the manufacture of gases used for illuminating purposes, carbonized from coking and cannel coal, shale, bitumen, or any oleaginous substances." June 30, 1873.
2281.—CHAPMAN, L., Connecticut, U.S.A., "Improvements in rotary pumps." (Complete specification.) July 1, 1873.
2307.—GILES, B., Blackheath, Kent, "An improved apparatus for heating water." July 3, 1873.

GRANTS OF PROVISIONAL PROTECTION.

2070.—WINCEN, H., Newcastle-under-Lyme, "Improvements in gas-meters." June 11, 1873.
2071.—LEIGH, J., Manchester, "An improved mode of treating sewage and other contaminated waters." June 11, 1873.
2152.—M'AVOY, H. L., Baltimore, U.S.A., "Improvements in apparatus for carburetting air for illuminating or heating purposes." June 19, 1873.
2174.—LOUTTIT, K. M'L. P., Greenwich, "Improvements in the manufacture of gas for heating and lighting purposes, and in the apparatus employed therefor." June 21, 1873.
2177.—HUNTER, A. G., Flint, "Improvements in apparatus for the manufacture of gas for illuminating and heating purposes." A communication. June 21, 1873.
2192.—SWEET, A., Hampstead Road, "Improvements in water-waste preventers and waste-preventing cocks, taps, or valves." June 24, 1873.
2199.—NICHOLSON, R., Dulwich, Surrey, "Improvements in junctions for gas and water mains and branches." June 24, 1873.
2214.—ROSS, O. C. D., Craven Street, Strand, "Improvements in the production of vaporized air for heating purposes generally, and in means for regulating and controlling the admixture of vaporized and other air when employed for such purposes." June 25, 1873.

NOTICES TO PROCEED.

704.—CHAPPELL, T., Finsbury Park, "Improvements in the manufacture of gas.' Feb. 25, 1873.
712.—HOEY, T., Glasgow, "Improved arrangements or apparatus for preventing waste of water." Feb. 26, 1873.
1637.—CASTRO, D. DE, Mortlake, Surrey, and BURTON, R., Camden Town, Middlesex, "Improvements in gas-meters." May 6, 1873.
1807.—TELLING, W. A., and JOHNSON, S., both of Wood Green, Middlesex, "Improvements in gas-meters." May 19, 1873.
1887.—BOX, W. W., Gas-Works, Crayford, "Improvements in apparatus used in the manufacture of gas." May 26, 1873.
1894.—SPENCER, W. H., New York, "Improvements in the process of and apparatus for manufacturing illuminating gas." May 26, 1873.
1915.—HOOD, W. C., Battersea, Surrey, "An improved meter for water and other liquids." May 28, 1873.
2000.—BAGGS, I., High Holborn, "Improvements in the manufacture of gas and gases for illuminating and heating purposes, and in apparatus to be employed in connexion therewith." June 4, 1873.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3822.—KINSEY, J., Leith, "Improvements in liquid-meters." Dec. 17, 1872.
3824.—PRINCE, A., Trafalgar Square, Charing Cross, "Improvements in hydro-oxygen gas-burners." A communication. Dec. 17, 1872.
3829.—LACKERSTEEN, J. F., Lombard Court, London, "Improvements in the manufacture of hydrogen gas." Dec. 17, 1872.
3852.—HENDERSON, A. C., Charing Cross, "Improvements in apparatus for filtering and defœcating water by radiation, in the mode of cleansing the said apparatus, and in its several applications." A communication. Dec. 19, 1872.
3863.—SIMON, L., and SIMON, R., Nottingham, "A new or improved method of applying petroleum products to illuminating purposes, and apparatus belonging thereto." A communication. Dec. 20, 1872.
3896.—BLOWN, J., Hindon Street, Middlesex, and BROWN, B., Charlotte Street, Surrey, "Improvements in lamps." Dec. 23, 1872.
1.—HARRISON, C. W., High Holborn, "Improvements in treating certain gases for lighting and heating purposes, and in combining atmospheric air therewith." Jan. 1, 1873.
33.—HENRY, M., Fleet Street, London, "An improved water-gauge." A communication. Jan. 2, 1873.
44.—BUCKLEY, S., Hyde, Chester, "Improvements in the construction of a combined pipe-wrench and cutter." Jan. 4, 1873.
45.—CROLL, A. A., Coleman Street, "Improvements in means or apparatus for the distillation of ammoniacal liquors, which improvements are also applicable in the distillation of other liquids, and in the concentration of soluble salts." Jan. 4, 1873.
80.—LAKE, W. R., Southampton Buildings, London, "An improved apparatus for manufacturing illuminating gas." A communication. Jan. 8, 1873.
104.—GEDGE, W. E., Wellington Street, Strand, "A new or improved water-meter." A communication. Jan. 10, 1873.
230.—ROBEY, J., Manchester, "A new or improved charcoal to be used for purifying sewage and other foul waters, and for disinfecting and deodorizing purposes." Jan. 20, 1873.
814.—WAKEFIELD, J., Birmingham, "Improvements in the construction of lamps." March 6, 1873.
884.—FISH, W. S., Glasgow, "Improvements in the manufacture of 'asbestos packing' for pipe-joints and other similar purposes." March 12, 1873.
1274.—ELLIS, A. W., Woodford, Essex, "Improvements in the treatment of substances and liquors containing ammonia and cyanogen, and in obtaining products therefrom." April 7, 1873.
1285.—ELLIS, A. W., Woodford, Essex, "Improvements in the utilization of waste products of ammoniacal liquor." April 8, 1873.
1366.—GILES, B., Blackheath, gas engineer, "An improved cooking apparatus." April 16, 1873.
1533.—COLLS, F. W., Erith, Kent, "Improvements in the manufacture of gas for heating and lighting purposes, and in the apparatus employed therefor." April 28, 1873.
1575.—DUFFEE, E., Haverhill, U.S.A., "Improvements in screens for coal-gas purifiers." May 1, 1873.
1597.—WRIGHT, W., Sheffield, "Improvements in the manufacture of gas for heating and illuminating purposes, and in apparatus for the same." May 3, 1873.

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FIG. 224.

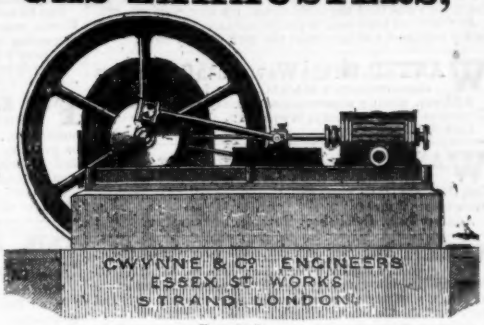

FIG. 225.

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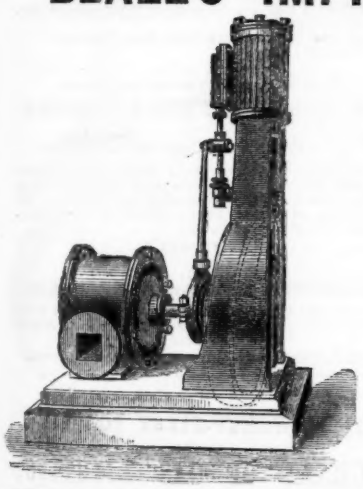

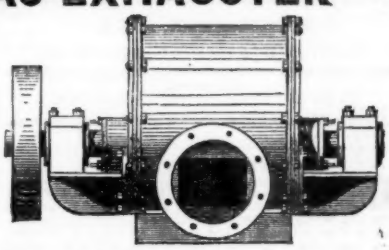

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(A guarantee of five years given with every Meter.)

PLUMBERS WORK, including Lift and Force Pumps; Cocks for Gas and Water and Steam; Brass Fittings.

HYDRAULIC AND GENERAL ENGINEERING.

LONDON OFFICE: 8, JOHN STREET, ADELPHI, W.C.

METER INSPECTOR, &c.

WANTED, by the Banbury Gas Company, a competent young MAN to take charge of the meters and read the indices, and lay service-pipes, &c.

Applications to be sent to the SECRETARY, stating age and salary required, not later than the 24th of July next.

WANTED, for the Weymouth Consumers Gas Company, a MANAGER and SECRETARY.

Address, stating experience and salary required, to the Chairman of the Company, WEYMOUTH.

July 9, 1873.

WANTED, by a young Man, aged 25, a situation as Clerk or Clerk and Collector to a Gas Company. Five years experience. Excellent references. Security if required.

Address J. S., 4, Salisbury Terrace, DORCHESTER.

WANTED, in a small country Gas-Work, a steady, industrious Man as WORKING MANAGER, who thoroughly understands the manufacture of gas, the setting of retorts, and fitting. Good house and garden at the works, with coals, gas, &c.

Address, with references, and stating wages required, to the SECRETARY, Gas Company, Knighton, RADNORSHIRE.

WANTED immediately, for a Gas-Work in South Wales, a steady and experienced GAS-FITTER. Must understand the taking of meter indices, be a good main and service layer, and able to do the ordinary repairs of the works.

Applications, enclosing testimonials, to be addressed to MANAGER, care of Mr. W. B. King, 11, Bolt Court, FLEET STREET, E.C.

GAS AND WATER.

WANTED, a General Manager who is thoroughly acquainted with the manufacture and distribution of gas, and competent to undertake the management of the Gas-Works at Chesterfield (annual make about 50 million feet), and of the Water-Works.

Applications, stating the salary required, to be sent to the undersigned, on or before the 1st of August next.

SHIPTON AND HALLEWELL,
Clerks of the Chesterfield Water-Works and Gaslight Company.

Chesterfield, July 7, 1873.

COLLECTOR AND CLERK.

WANTED, by the Redhill Gas Company, a COLLECTOR and CLERK. Will have to take the meters, collect the accounts, and assist generally in the office work. Salary £80 per annum. Security will be required.

Testimonials not required, and if sent will *not* be returned.

Applications, stating age, present employment, and names of references, to be addressed, not later than the 21st inst., to W. B. WATERLOW, Esq., Chairman, Gas-Works, Redhill, SURREY.

COOKING AND HEATING BY GAS,
BY
MAGNUS OHREN, A.I.C.E.

NEW AND REVISED EDITION.

Prepared for Gas Companies to circulate amongst their gas consumers.

£1 per 100; £3 15s. per 500; or £6 per 1000.

Address, MAGNUS OHREN, Gas-Works Lower Sydenham, London, S.E.

COST PRICE SHEETS.

MANUFACTURE AND DISTRIBUTION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.

South Shields, January, 1873. W. J. WARNER.

SITUATION WANTED by a young man as Clerk, Meter Inspector, or Collector. Six years experience. First-class references. Would prefer to go abroad.

Apply to B. B. J., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS MAKERS.

A COMPETENT Engineer, Mechanist, Manufacturer, and Gas-Fitter, is required as WORKING MANAGER for country works, making about 2,000,000 feet of gas per annum.

Address, with terms and testimonials, N. G., Messrs. Harwar, Furnival's Inn Gateway, Holborn, LONDON.

AN experienced Main and Service Layer wishes for a re-engagement as WORKING FOREMAN, or is prepared to undertake the laying of mains and services (labour and tools only) under contractors or companies, by the yard or job.

Address CHARLES HALL, 11, Pritchard's Road, Hackney Road, LONDON, E.

PUPIL WANTED.

THE Advertiser is open to take a Youth about 16 or 17 years of age as an ARTICLED PUPIL. He would have good opportunities of acquiring a thorough knowledge of the management and erection of both Gas and Water Works.

For terms, &c., apply to T. A. DREW, Engineer and Manager, Gas and Water Works, WIDNES.

FOR SALE—A good Station-Meter, to pass 2500 feet per hour, with 6-inch connexions and bye-pass complete.

Apply at the GAS-WORKS, Holywood Company, DOWN.

Holywood, July 8, 1873.

FOR SALE, at the Thetford Gas-Works, a CONDENSER in excellent order. It has 4-inch inlet and outlet ties under the box, and 16 pipes 3½ in. bore and 9 ft. long.

Apply to THOMAS H. METHVEN, Gas-Works, BURY ST. EDMUND'S.

FOR SALE—One 40 ft. by 16 ft. Gasholder, at present in use, with 7-in. inlet and outlet pipes and hydraulic valves complete.

Can be seen working at the Radcliffe and Pilkington Gas-Works, near Manchester, or any information can be obtained respecting the same by application to D. BRANDWOOD, the Company's Manager and Secretary.

July 7, 1873.

FOR SALE, a Set of Four Second-hand PURIFIERS, 5 ft. square, 2 ft. 6 in. deep, inlet and outlet 6 in., with 5-in. connexions; four tiers wood sieves or grids to each, hydraulic centre-valve, lifting apparatus and girders, heavy castings, and fastened with ⅝-in. angle iron. Removed to place Purifiers of larger dimensions.

For price and particulars, apply to THOS. H. BOUTTELL, Manager and Analyst, Gas-Works, SLEAFORD.

FOR SALE—A Set of Purifiers and Condenser.

Two Purifiers, 6 ft. by 3 ft. by 2 ft. 9 in. deep.
Two do., 5 ft. by 3 ft. 8 in. by 3 ft. deep.
Four Donkin's Four-way Valves, with 6-in. connexions complete.
One Close-box Condenser, with 3 pairs of flat pipes 14 ft. high.

The above have just been replaced by larger ones, and are in perfect condition.

Apply to R. J. SKYNNER, Gas and Water-Works, MONMOUTH.

MAIRIE DE BORDEAUX.

THE Mayor gives Notice that the Lighting by gas of the city of Bordeaux will be DISPOSED OF by public auction on the 24th of July next.

The terms of the contract may be ascertained at the SECRETARY'S Office of the Mayoralty.

TO BE DISPOSED OF, in consequence of being replaced by larger ones, a pair of 6 H.P. VERTICAL ENGINES, with oscilating cylinders, and a pair of 20,000 feet per hour Rotary Exhausters, with all valves and connexions.

Also 28 15-in. D Mouthpieces and Ascension-Pipes to suit.

The above are in good condition, and will be sold together or separately.

Apply to W. C. WATSON, Engineer, Gas-Works, KINGSTON-ON-THAMES.

THE NEW GAS COMPANY, LIMITED.

THE Directors of the above Company are ready to receive APPLICATIONS from owners of existing Gas-Works, as well as from others erecting or about to erect new works, and to grant Licences for the use of the Patents.

Apply to the SECRETARY, 22, WALBROOK, E.C.

THE Gas-Works Committee of the Widnes Local Board are prepared to receive TENDERS for the supply of an EXHAUSTER of 20,000 cubic feet per hour capacity, also for an ENGINE of about 10 horse power, particulars of which may be obtained on application to the undersigned.

Offers to be addressed to the Chairman of the Gas-Works Committee, endorsed "Tender for Engine or Exhauster," and delivered at the Gas-Works, Widnes, not later than the 2nd of August next.

The Board does not bind itself to accept the lowest or any tender.—By order of the Board,

T. A. DREW, Engineer, &c.

Gas-Works, Widnes, July 9.

TO COAL AND CANNEL PROPRIETORS.

THE Gas-Works Committee of the Widnes Local Board are prepared to receive TENDERS for the supply of about 6000 tons of GAS COAL and CANNEL, to be delivered free on their siding at the Gas-Works, Widnes, in such quantities and at such times as may be required, the whole to be delivered between the 15th of August next and the 1st of June, 1874. Further particulars may be obtained on application to the undersigned.

Offers to be addressed to the Chairman of the Gas and Water Works Committee, endorsed "Tender for Gas Coal," and delivered at the Gas-Works, Widnes, not later than the 2nd of August next.

The Board does not bind itself to accept the lowest or any tender.—By order of the Board,

T. A. DREW, Engineer and Manager.

Gas-Works, Widnes, July 9.

TO COKE CONTRACTORS AND OTHERS.

THE Directors of The Gaslight and Coke Company are prepared to receive OFFERS from parties willing to undertake the SALE, on commission, of COKE manufactured at their works at Beckton for One year, from the 1st of October next.

Further information, if desired, may be obtained at this Office, on application to the undersigned, to whom sealed tenders, marked "Sale of Coke on Commission," containing reference to a London Banker, should be sent on or before Thursday, the 31st inst.—By order,

JOHN ORWELL PHILLIPS, Secretary.

Horseferry Road, Westminster, July 12, 1873.

TO COKE CONTRACTORS AND OTHERS.

THE Directors of The Gaslight and Coke Company are prepared to receive TENDERS for the purchase of the whole or any portion of the COKE which will be manufactured at their works at Beckton, on the river Thames, near Barking Creek, for One year, from the 1st of October next.

Tenders should state the price per chaldron of 36 bushels for delivery free on board barges alongside the Company's wharf at Beckton, or into trucks on the Company's line of railway which communicates with the Great Eastern Railway near North Woolwich.

Contractors may be required to enter into a bond, with sureties, for the due performance of their contract.

Payments monthly, in cash.

Further information, if desired, may be obtained at this Office, on application to the undersigned, to whom sealed tenders, marked "Tender for Coke," should be sent on or before Thursday, the 31st inst.—By order,

JOHN ORWELL PHILLIPS, Secretary.

N.B.—The Directors do not bind themselves to accept the highest or any tender, and reserve to themselves the right of accepting the whole or any portion of one tender.

Horseferry Road, Westminster, July 12, 1873.

LICHFIELD WATER-WORKS.

CONTRACTS Nos. 1 & 2.

TO BUILDERS AND CONTRACTORS.

THE Trustees of the Conduit Lands in the City of Lichfield are prepared to receive TENDERS for the construction of an Engine-house, Boiler-house, Cooling Pond, Cottage, and other works connected therewith, included in Contract No. 1; and for the construction of a covered Service Reservoir, and other works connected therewith, included in Contract No. 2.

Drawings and specifications may be inspected, and forms of tender and schedules of quantities may be obtained (on payment of One Guinea for each set), on and after Monday, the 14th day of July inst., at my Office, in the City of LICHFIELD, and at the Office of Messrs. THOMAS AND CHARLES HAWKSLEY, Civil Engineers, 30, Great George Street, WESTMINSTER, S.W.; and sealed tenders must be delivered at my Office, endorsed "Lichfield Water-Works—Tender for Contracts Nos. 1 & 2," on or before Wednesday, the 30th day of July inst.

The Trustees do not pledge themselves to accept the lowest or other tender.—By order,

HENRY S. CHINN, Warden.

Lichfield, July 7, 1873.

Demy 16mo., Sixty-four pages,

ADVANTAGES of GAS. By J. O. N. RUTTER. A new edition.—201st Thousand. Brighton: Published by the Author.

This little book is intended for distribution by Gas Companies and the manufacturers of gas apparatus. It has done good in making known the benefits and promoting the sale of gas; and it is hoped that its usefulness might be continued and greatly extended.

Prices:—1000 copies, £8; 500 copies, £4 5s.; 250 copies, £2 5s. Any smaller number at 20s. per 100 copies.

A specimen copy free per post for three penny stamps. Covers printed specially.

Apply to J. O. N. RUTTER, Black Rock, BRIGHTON.

Nov. 13, 1871.

In the press, and will shortly be published,

THE GAS CONSUMER'S MANUAL;
OR,
How to obtain Good Light and Cheap Gas.

Being a Popular Exposition of the Chemistry of Gas Lighting, with Practical Instructions in the best methods of burning Gas for Lighting, Cooking, and Heating; and Suggestions as to the proper Sizes of Interior Pipes, Arrangement of Lights, &c., &c.

ILLUSTRATED.

ALSO,

ON SETTING AND WORKING RETORTS.

A Revised and Illustrated Reprint of a Paper read at the Annual Meeting of the British Association of Gas Managers in 1870.

By E. S. CATHELS, Assoc.Inst.C.E., Montreal, Canada.

Price 25s., bound in cloth, lettered,

THE TWENTY-FIRST VOLUME
OF THE
JOURNAL OF GAS LIGHTING,
WATER SUPPLY, AND SANITARY
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(Successors to LYNCH WHITE,)

SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

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TO GAS COMPANIES, ENGINEERS, CONTRACTORS, AND OTHERS.

GEORGE NEWTON,

UNION STREET WEST, OLDHAM,

BRASS FOUNDER AND FINISHER,

MANUFACTURER OF

IMPROVED WET AND DRY CONSUMERS GAS-METERS,

LAMP METERS AND BOXES,

GOVERNORS, GAUGES, INDICATORS, EXHAUST & PRESSURE REGISTERS,

GAS STATION-METERS,

With all the joints planed.

TERMS, &c., ON APPLICATION.

REMOVAL.

MR. ALFRED PENNY, C.E., begs to give notice that he has REMOVED his Offices from the Wenlock Iron-Works to No. 20, ABINGDON STREET, WESTMINSTER, where he may be consulted as usual on all matters connected with Gas-Works, Water-Works, and Drainage, both for England and Abroad.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, WESTMINSTER.

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IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES

TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ;

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

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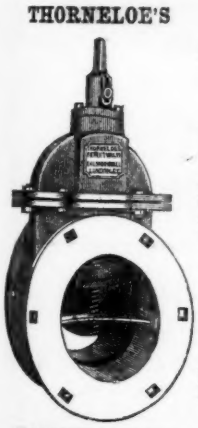
Drawings and Prices upon application.

THORNELOE'S



PATENT VALVE.

THORNELOE & COCHRAN,

GAS ENGINEERS AND CONTRACTORS,

SOLE MAKERS OF

CHANDLER AND SON'S

PATENT REGULATING DIP-PIPE.

Copy Testimonial.—A series of experiments have taken place at the Erith Gas-Works with "Chandler's Patent Dip-Pipe," which was found to prevent any deposit of carbon taking place at the back or on the surface of the clay retorts; there was also considerable increase of gas per ton of coal carbonized, whilst the apparatus continues working with the greatest simplicity and certainty.

Prospectus, with Price Lists and Particulars, on Application.

THORNELOE'S PATENT VALVE

For GAS and WATER, from 3 to 24 inches,

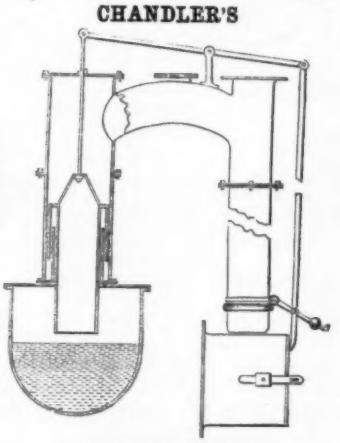
SUPPLIED FROM STOCK.

They are now in use at the following Gas-Works in London:—PHŒNIX and SOUTH METROPOLITAN; also at Aylesbury, Aldershot, Colchester, Farnham, Guildford, Leicester, Ilford, Middlesboro' Patent Gas Company, Reading, &c.

ADDRESS—

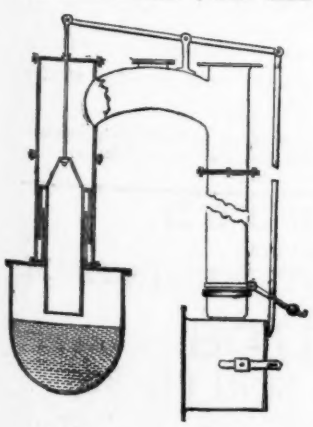
34, LONDON WALL, LONDON, E.C.

CHANDLER'S



PATENT DIP-PIPE.

CHANDLER'S PATENT DIP-PIPE.



It is well known by all Gas Managers that back pressure upon the retorts greatly retards the production of gas, causing a deposit of carbon which keeps steadily accumulating. Such carbon reduces the capacity of the retorts, requires extra fuel for heating, and has to be frequently removed by heavy iron bars, which very much injure the retorts. By the use of Chandler's Patent Dip all these evils are entirely remedied. When the retorts are being drawn and charged, the Dip-Pipe is sealed in the fluid of the hydraulic main. As soon as the lids are replaced, the Dip is raised completely out of the fluid, and the gas passes unrestricted to the holders. By running the exhauster to a level gauge, ALL PRESSURE IS REMOVED FROM THE RETORTS. The consequence is that there is no deposit of carbon, no need of scurfing, no extra fuel is required, a large saving of wear and tear and loss of time is effected, and a greatly increased production of gas per ton of coal is realized.

The manager of the Erith Gas-Works has used the Patent Dip-Pipe to a single retort for some months, with complete success in regard to all the advantages mentioned, and has now ordered the patent to be applied to other retorts. He has kindly consented to reply to any inquiries that may be addressed to him. [See notice in JOURNAL OF GAS LIGHTING, page 413, May 6, 1873.] The Patent Dip-Pipe is also ordered for trial in several other places.

For terms of use and cost, apply only to the Patentees,

Messrs. CHANDLER & SONS, YORK STREET, LONDON ROAD, SOUTHWARK, LONDON, S.E.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

SAMUEL PONTIFEX, Consulting Gas Engineer, having retired from the Great Central Gas Company, is now prepared to furnish PLANS and SPECIFICATIONS, as well as ADVISE Provincial Gas Companies as to the erection of new, or alteration and enlargement of existing works.

Offices: 22, Coleman Street, LONDON, E.C.

J. T. B. PORTER & A. SILVERTHORNE, C.E., 1, Westminster Chambers, LONDON, S.W., Consulting Engineers.

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DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

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CAST-IRON SOCKET-PIPES FOR WATER OR GAS.

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SPRINGBANK IRON-WORKS, GLASGOW,

Have FOR SALE at their branch works, South Stockton-on-Tees, the following PIPES of superior quality, all proved to 300 feet:—

Size.	Length.	Weight per Pipe. Cwt. qr. lb.	Quantity.
1¼ in.	6 ft.	0 1 2	1000 pipes.
2 "	6 "	0 1 14	2000 "
3 "	9 "	0 3 14	4500 "
3 "	9 "	0 3 21	550 "
4 "	9 "	1 1 14	3500 "
5 "	9 "	1 3 14	300 "
6 "	9 "	2 1 14	100 "

For terms address THOMAS ALLAN AND SONS, GLASGOW.
June 9, 1873.

E. GODDARD,
GAS-WORKS, IPSWICH,
SOLE AGENT FOR
EDGE'S PATENT
FOR REMOVING THE
CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

OXIDE OF IRON.—We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
FRANCIS RITCHIE & SONS,
BELFAST.

FIRE-CLAY RETORTS.

WILLIAM FRASER,
INVERKEITHING,

(Owner of the Works at which Fire-Clay Retorts were first made), can supply

RETORTS, FIRE-BRICKS, &c.,
to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

He ships at Charlestown his
CELEBRATED HALBEATH STEAM COALS,
on Navy List.

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GAS ENGINEERS,
MANUFACTURERS AND CONTRACTORS FOR
GAS APPARATUS, GASHOLDERS, TANKS,
VALVES, IRON ROOFS, GIRDERS,
BRIDGES, &c.,
CALEDONIA IRON-WORKS, PAISLEY.

Attention is requested to
BRODIE'S IMPROVED GAS APPARATUS,
Admitted to be the best and most economical for lighting factories, railway stations, mansions, country houses, and other isolated buildings.

TORBANEHILL MINERAL.

For Sale, by Tender,
FOR WHOLE OR PART,
SEVERAL THOUSAND TONS OF THE
Celebrated Torbanehill Mineral,
Saved from the fire at Torbanehill in June last.

The mineral as it at present lies has been examined and analyzed by Dr. WILLIAM WALLACE, Analytical Chemist, Glasgow, who says:

"Very great care was employed to obtain reliable average samples, and the results show that the mineral is not appreciably damaged."

The results of two testings of fair samples of the Coal give 14,080 cubic feet of 43·7 candle gas.

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J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

MANUFACTURERS OF

IMPROVED CONSUMERS GAS-METERS,

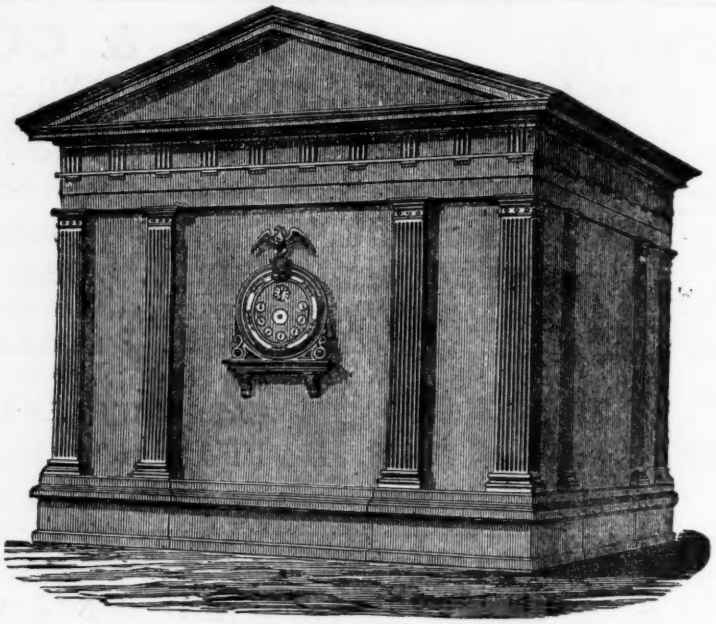
Of the best material and workmanship, carefully adjusted to the requirements of the British Sales of Gas Act and Foreign Standards of Measures.

PATENT FIXED WATER-LINE GAS-METERS,

Which are uniform with the ordinary Meters, and register with minute accuracy.

IMPROVED DRY GAS-METERS,

IN BEST TINNED IRON CASES.



GAS STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, EXHAUST-GOVERNORS, &c.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.

ESTABLISHED 1844.

WHITLEY PARTNERS,

RAILWAY WORKS, LEEDS,

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MANUFACTURERS OF IMPROVED STEAM-ENGINES, BOILERS, PUMPS, &c.;

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THE FIRST PRIZE MEDAL AT THE EXPOSITION UNIVERSELLE, PARIS, 1867,
"For Improved Construction, Excellence of Material, and Superior Workmanship;"
TWO GRAND GOLD MEDALS AT THE MOSCOW INTERNATIONAL EXHIBITION, 1872;
ALSO THE FIRST PRIZE MEDALS AT LEEDS AND LYONS IN 1858, 1868, and 1872.
"REDUCTION IN PRICES OF PEET'S VALVES, consequent upon largely increased sales."

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Correspondence conducted in English, German, or French.

Samples of Specialties may be inspected at Stand No. 542, Group XIII., in the English Machinery Annexe of the Vienna Exhibition, 1873. For List of same see German Official and "British Section" Catalogues.

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Brookfield Works,

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MANUFACTURER OF

WOOD GRIDS

FOR PURIFIERS AND SCRUBBERS,

AND

CONTRACTOR FOR GAS APPARATUS & MAIN-LAYING.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

SCHOLL'S

PATENT PLATINUM

GASLIGHT PERFECTER.

Extract from Report by Dr. Letheby:—

"The results have been very remarkable, for they show an average increase of 63 per cent. on the illuminating power of the gas. I am of opinion, therefore, that the invention is of great practical value."

Extract from Dr. Frankland's Course of Lectures at the Royal School of Mines, February, 1868.

"Scholl's Platinum Perfecter is one of the most important inventions of modern times in connexion with the burning of coal gas."

Price 1s. each for Fishtail Burners.

To be had retail of Gas-Fitters and Ironmongers.

JOHN SCHOLL, Manufactory: 41 & 42, BERWICK STREET;

Retail Depot: 198a, OXFORD STREET, LONDON, W.

Terms on application. N.B.—A specimen sent free on receipt of Twelve stamps.

*** Further testimonials from Drs. Frankland and Crooks, showing the great practical value of this invention, will be shortly published.

CANNEL COAL.

ELLIS LEVER & CO.,

GAS COAL MERCHANTS,

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ALL CLASSES OF

ENGLISH, SCOTCH, & WELSH CANNEL COALS.

SAM. CUTLER & SONS,

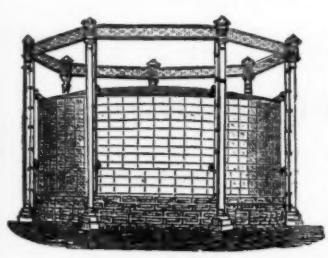
CONTRACTING GAS ENGINEERS,

GASHOLDER & GENERAL GAS APPARATUS MAKERS,

MANUFACTURERS OF

BOILERS, IRON ROOFING, IRON BRIDGES,

AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works**, for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs**, and every description of **Apparatus** for the Manufacture and Distribution of Gas.

Special attention is invited to their **"Improved Condenser,"** which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers**, and **Purifiers**, of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves.**

WORKS FOR THE SUPPLY OF

VILLAGES, MANSIONS, FACTORIES, &c.

S. C. AND SONS undertake the **Supply** and **Laying** of **Mains** for **Gas and Water**, and supply all Castings, Connexions, and Fittings for Retort-House, Works generally, and for Streets. They also supply **Valves** of all descriptions, Iron and Clay Retorts, Hotpressed Retort-Lids, Steel Charging-Scoops of improved make, for which they have special machinery, Improved Coke and Coal Barrows, Cross-Bars and Screws, Bolts and Nuts, Furnace and Stoking Tools, Iron and Wood Purifier-Sieves, Lead, Yarn, Borings, &c., including every requisite whatsoever for a Gas-Work, a well-assorted stock being kept of those goods most in request.

SOLE MAKERS OF BRETT'S PATENT COKE BARROW.

Experienced Retort Setters sent to any part of the Kingdom.

Address: PROVIDENCE IRON-WORKS, MILLWALL, LONDON.

B. CARPENTER'S

IMPROVED WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

WORKS:

22, HERMES STREET, PENTONVILLE ROAD,

LONDON, N.

The above Sieves are used by all the Gas Companies in London and a great many in the country. Their utility, durability, and cheapness combined, render them superior to all others.

Testimonials from Gas Engineers who have tested their qualities forwarded on application.

All orders punctually attended to, and estimates given if required.

INTERNATIONAL EXHIBITION, 1862.

CLASS X.

PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,

THROCKLEY,

NEWCASTLE-ON-TYNE.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of Clay Retorts, Fire-Bricks and every description of Fire-Clay Goods.

CLAYTON'S PATENT SIX-WAY VALVE only requires one valve to work two purifiers; saves more than three-fourths of the connexion-pipes; requires neither tees, elbows, nor bends; no racks or springs to get out of order.

For particulars, apply to CLAYTON, SON, & Co., Gas Engineers, Hunslet, LEEDS.

TO GAS COMPANIES, ENGINEERS, &c.

WOOD SIEVES.—WOOD SIEVES.

Estimates given and Contracts taken by the Manufacturer

GEORGE MACKANESS,

36, EDWARD STREET, HAMPSTEAD ROAD,

LONDON, N.W.

These Sieves are made with parallel or bevel bar, and guaranteed to be well seasoned yellow deal, and not common spruce so generally used.

N.B.—Specimens sent free on application.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 20 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

ALEXANDER F. PAINTER,

CONTRACTING ENGINEER

FOR

GAS & WATER WORKS,

GREAT BERKHAMPSTEAD, HERTS.

Foreign Orders carefully executed. Provincial Gas-Works designed and erected. Extensions of Works carried out with despatch. Mains supplied and promptly laid. Public and Private Buildings fitted up. Gasholders, Purifier Covers, and all Sheet Ironwork. Wrought Ironwork to drawing.

Specifications, Estimates, and Tenders given.

GAS-WORKS LEASED.

THE IMPERIAL METER COMPANY, LIMITED,

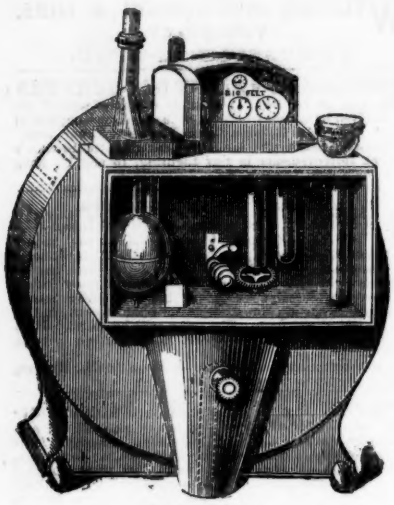
MANUFACTURERS OF

WET AND DRY GAS-METERS,

PRESSURE-GAUGES AND GOVERNORS, AND STREET-LAMP REGULATORS.

FACTORIES:

KING'S ROAD, LONDON, N.W., and GRAY'S INN ROAD, LONDON, W.C.



Front View.

THE

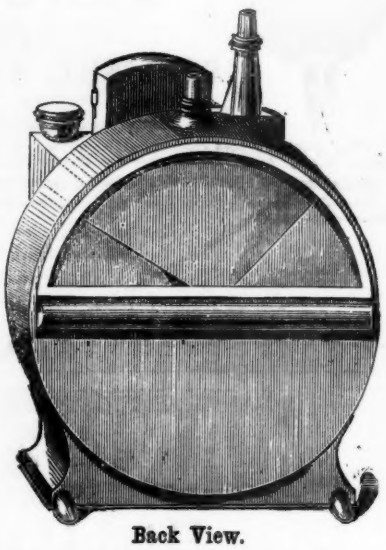
IMPERIAL

COMPENSATING

WET GAS-METER.

DE CASTRO & BURTON'S

PATENT.



Back View.

I. **This Meter is more simple in construction than the common non-compensating Meter.**
II. **An unvarying water-line is maintained.**
III. **No amount or kind of pressure will cause it to "flood."**
IV. **It is practically unaffected by "tilting."**
V. **The friction is less than in any other Meter; and**
VI. **It will last for twelve months without requiring to be refilled.**

THE IMPERIAL METER COMPANY, LIMITED, ALSO MANUFACTURE COMMON NON-COMPENSATING WET GAS-METERS OF ALL SIZES, BOTH IN TIN AND CAST-IRON CASES.

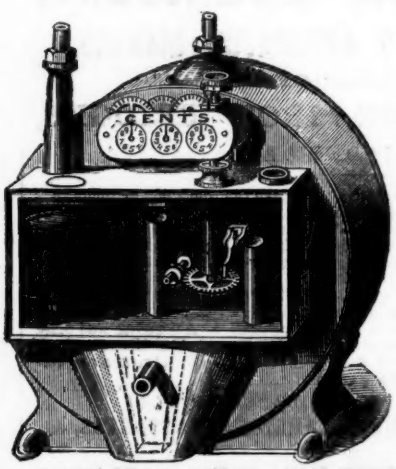
THE COMPENSATING

WET GAS-METER

IS UPHELD FOR

TEN YEARS

WITHOUT CHARGE.



THE IMPERIAL WET GAS-METER.
Non-Compensator.

STATION-METERS

WITH PLANED JOINTS,

AND

GOVERNORS,

MADE TO ORDER.

Mr. GEORGE MACKANESS will represent this Company in the Provinces.

OFFICES: 41, FLEET STREET, LONDON, E.C.

W. MOORE, Secretary.

☞ *All Communications to be addressed to the Secretary.*

THE IMPERIAL METER COMPANY, LIMITED,

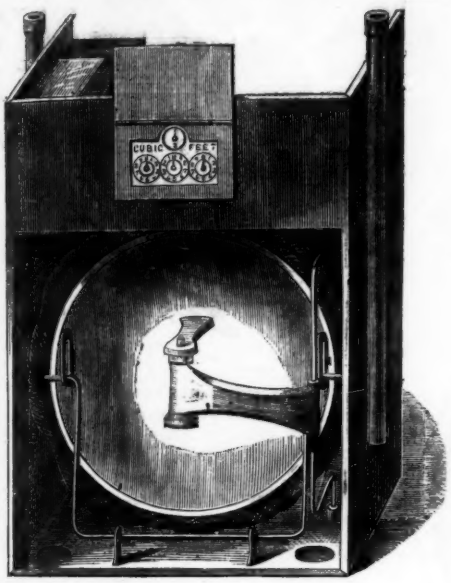
MANUFACTURERS OF

WET AND DRY GAS-METERS,

PRESSURE-GAUGES AND GOVERNORS, AND STREET-LAMP REGULATORS.

FACTORIES:

KING'S ROAD, LONDON, N.W., and GRAY'S INN ROAD, LONDON, W.C.



Front View.

THE

IMPERIAL

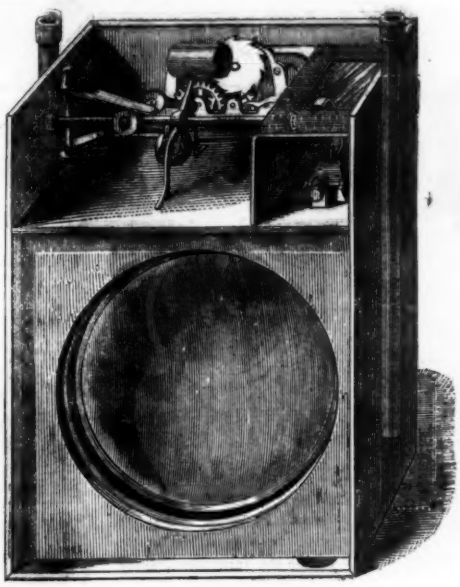
DRY

GAS-METER

SINGLE DIAPHRAGM.

TELLING & JOHNSON'S

PATENT.



Back View.

I. The mechanical construction of this Meter is simpler and stronger than any other.
II. About half as much leather is used as in ordinary dry Meters.
III. The Meter has only one valve, and this cannot "stick."
IV. The lights maintain perfect steadiness and strength of flame. There is no "draw."
V. The gas consumed can only be measured from the inlet to the outlet, and
VI. The index cannot be made to register backwards.

THE IMPERIAL METER COMPANY, LIMITED, ALSO MANUFACTURE ORDINARY DOUBLE DIAPHRAGM DRY GAS-METERS OF ALL SIZES, BOTH IN TIN AND IN CAST-IRON CASES.

SPECIAL ATTENTION

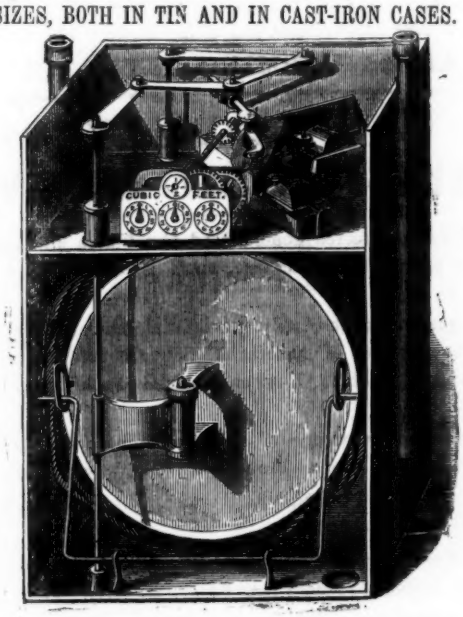
IS PAID TO THE

MANUFACTURE OF

STREET-LAMPS

AND

REGULATORS.



EVERY

DRY GAS-METER

IS UPHELD FOR

SIX YEARS

WITHOUT CHARGE.

THE IMPERIAL DRY GAS-METER.
Double Diaphragm.

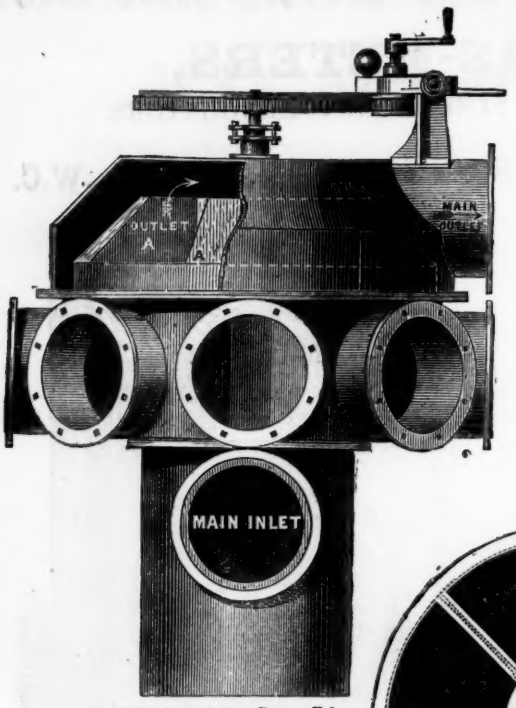
Mr. GEORGE MACKANESS will represent this Company in the Provinces.

OFFICES: 41, FLEET STREET, LONDON, E.C.

W. MOORE, Secretary.

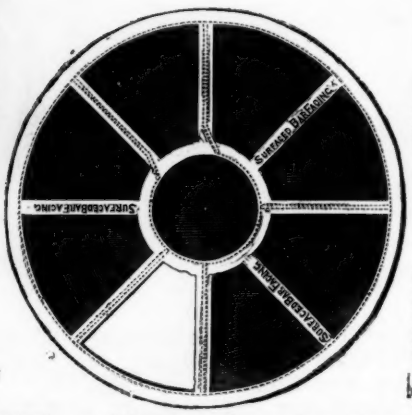
☞ *All Communications to be addressed to the Secretary.*

C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.

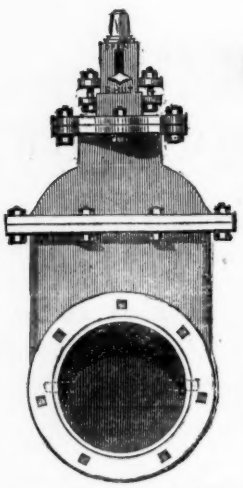
Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



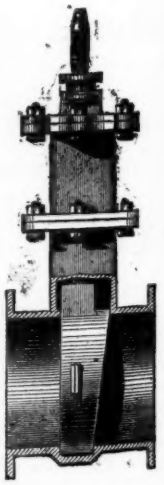
Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.



C. & W. WALKERS'
DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves are superseding the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

GASHOLDERS, TELESCOPE & SINGLE-LIFT, of LARGEST DIMENSIONS.

PURIFIERS, SCRUBBERS, CONDENSERS of most Improved Description.

WOOD SIEVES FOR PURIFIERS,

Which have now been in use for more than ten years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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COLLIERY OFFICE, STOURBRIDGE.

SCARCITY OF COALS!!!

G. J. EVESON has on offer large quantities of CANNEL COAL and ordinary GAS COAL for immediate delivery to any part of England. Rates and prices on application.

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COLLIERY OFFICE, STOURBRIDGE.

GAS COKES TAKEN IN ANY QUANTITY IN RETURN WAGGONS, OR WAGGONS SPECIALLY SENT.

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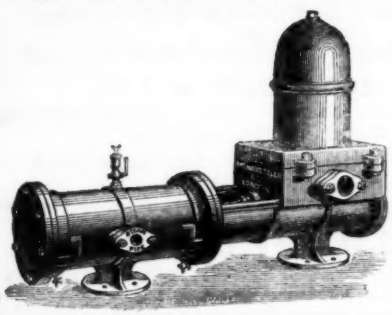
PHŒNIX FIRE-BRICK WHARF,

64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

THE PATENT

"UNIVERSAL" STEAM PUMP.



SOLE MAKERS,

HAYWARD, TYLER, & CO.,

84 & 85, UPPER WHITECROSS STREET, LONDON, E.C.

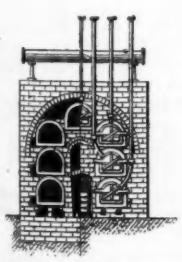
IN USE IN SOME OF
THE PRINCIPAL GAS-WORKS IN LONDON, SHEFFIELD, PENISTONE, &c.,
FOR
TAR AND AMMONIACAL LIQUORS.

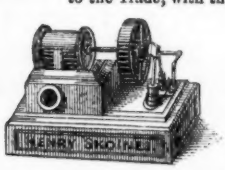
Ardwick Bridge Chemical Works, Manchester, Oct. 28, 1872.

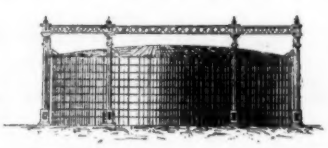
Sir,—The "Universal" Steam Pump obtained from you, and which has been employed during the last six months pumping caustic soda at these works, still continues working satisfactorily.—Yours truly,
(Signed) PETER HART, *Manager.*

HENRY SKOINES,

CONTRACTING GAS ENGINEER
FOR
SETTING RETORTS,
ERECTING AND REMODELLING GAS-WORKS
OF ANY EXTENT, AT HOME AND ABROAD.
RETORTS RESET, and the whole or any portion of Gas Apparatus supplied to the Trade, with their choice of name and device, if desired.







7, ARGYLE STREET, KING'S CROSS.

JOSEPH AIRD,

WELLINGTON TUBE-WORKS,

GREAT BRIDGE, TIPTON,

STAFFORDSHIRE,

MANUFACTURER OF

PATENT WELDED WROUGHT-IRON TUBES AND FITTINGS.

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16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B Instruments, Bells, and Apparatus.
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EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main-Pipes by an improved Patent, General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

DEMPSTER'S
RENOWNED
WOOD SIEVES,
WITH TAPER BARS,
MADE BY MACHINERY
CAPABLE OF MAKING 10,000 FEET WEEKLY.
References to Hundreds of First-Class Engineers.
ROSE MOUNT IRON-WORKS,
ELLAND, NEAR HALIFAX.

CLOTH GAS-BAGS FOR MAINS,

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber and Gutta-Percha Machine-Bands, Sheet and Washers for Steam Joints.

T. BUGDEN, Manufacturer,
79, GOSWELL ROAD, LONDON, E.C.

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CATOPTRIC LAMP
for Streets and all Situations where the Light ascending above the level of the Lamp is wasted,
Is now in use in Moorgate St., London, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.
T. A. SKELTON, 37, Essex St., Strand, LONDON,
INVENTOR AND PATENTEE.

EVERY DESCRIPTION
OF
GAS COAL AND CANNEL
SUPPLIED BY
E. FOSTER & CO.,
COAL and CANNEL
MERCHANTS,
21, JOHN STREET, ADELPHI,
LONDON, W.C.

Prices Quoted on application.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,
METAL MERCHANTS AND CONTRACTORS
18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES AND FURNISHINGS.
MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.
AGENTS FOR THOMAS GLOVER & CO.'S
PATENT DRY GAS-METERS
DELIVERY F.O.B. ON CLYDE.
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FIRE CLAY & BRICK WORKS,
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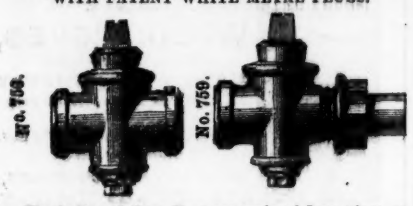
Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
Successors to
E. BAKER AND CO., LATE BRIERLEY HILL, STAFFORDSHIRE.

PRICE'S PATENT COKE & COAL BARROW,

effecting a great saving of time, labour, and expense.
For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.



The bodies of these Taps are made of Iron, black or galvanized, and the Plugs of Patent Metal. They are warranted not to set fast or corrode as do iron or brass Cocks, will always work easily, are strong, well made, durable, of little or no intrinsic value, and, therefore, not likely to be stolen; and the PRICES are (especially upon the larger sizes) FULLY 50 PER CENT. LESS THAN BRASS COCKS.

GAS-JOINTS, CHANDELIERS, PENDANTS, BRACKETS, ETC.:
WROUGHT-IRON WELDED TUBE AND FITTINGS,
BRASS, COPPER, LEAD, TIN, AND COMPOSITION TUBING,
Stocks, Taps, and Dies, and Every Description of Gas-Fitters' Tools; Gas Slide and Sluice Valves;
CARTER'S SAFETY GAS-VALVES;
GAS-STOVES, REGULATORS, BURNERS, &c.
Pattern-Book and Price List of Gas-Fittings, supplied on application.
THOS. LAMBERT & SONS, Lambeth, London, S.E.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY,
and every Article suitable for
GAS AND WATER WORKS.

WALTER MABON & CO.,
Engineers,
ARDWICK IRON-WORKS,
FAIRFIELD STREET, MANCHESTER,
MANUFACTURERS OF
IRON TANKS, GASHOLDERS,
GAS APPARATUS,
PIPES, VALVES, IRON ROOFS,
WROUGHT AND CAST IRON GIRDERS.

DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,
SUPPLY GAS & WATER PIPES of EVERY SIZE.
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
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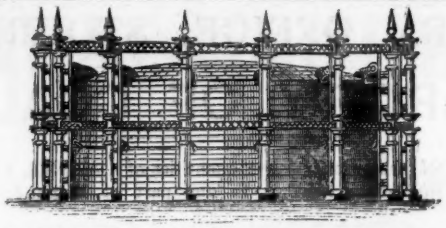

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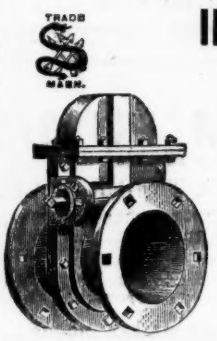

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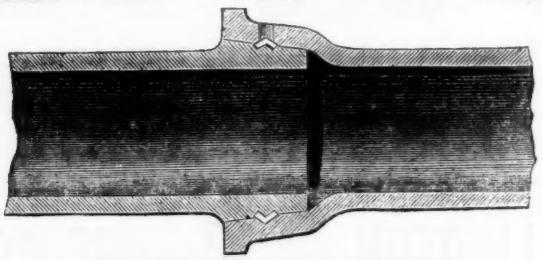

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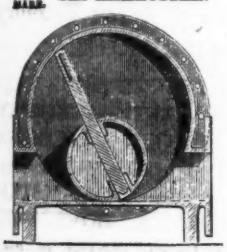

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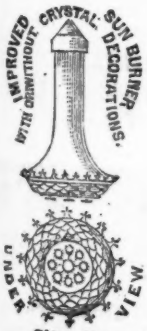

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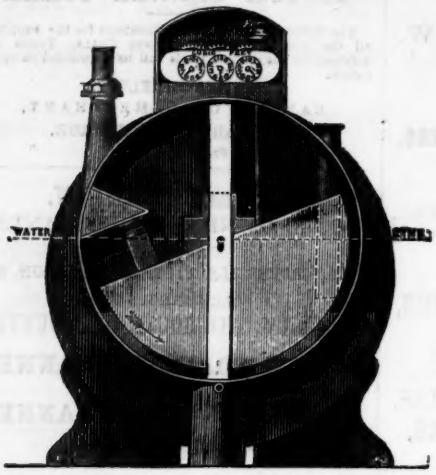

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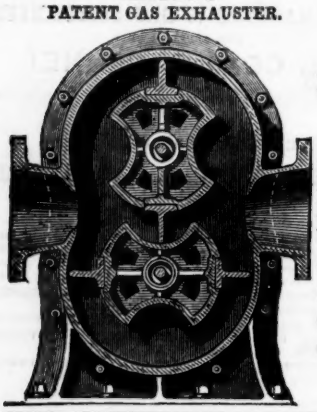

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